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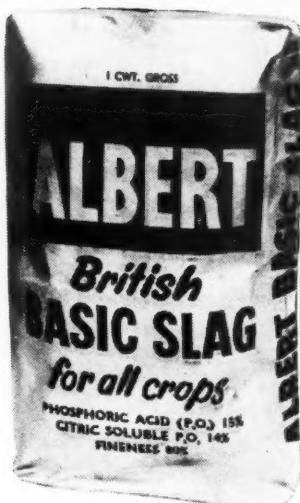
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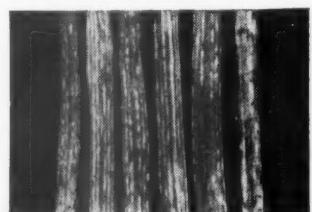
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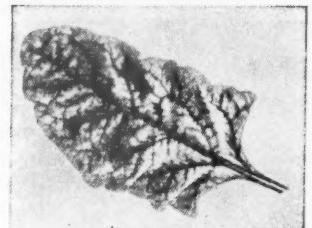
Beans—illustrating deficiency of manganese. Chlorosis between the veins of the leaves may be observed. Separation of seed cotyledons reveals dark spots or cavities on the exposed flat surfaces.



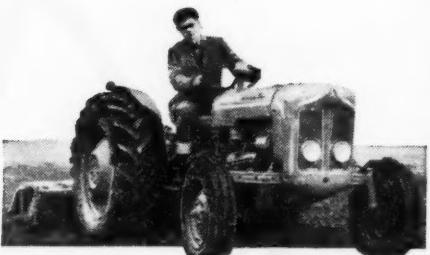
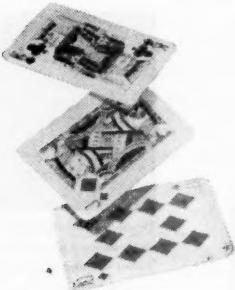
Tomato Leaf—illustrating deficiency of manganese. Intervenal chlorotic mottling distributed over entire surfaces of leaflets; mottled areas become necrotic.



Oat Leaves, illustrating deficiency of manganese ('grey-speck'). Grey streaks and stripes of chlorosis (loss of colouring).



Sugar Beet Leaf, illustrating deficiency of manganese ('speckled yellows'). Leaves of affected plants tend to be erect, triangular, with margins curling upwards.



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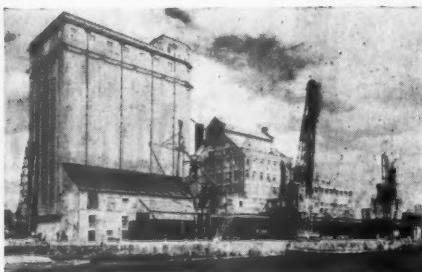
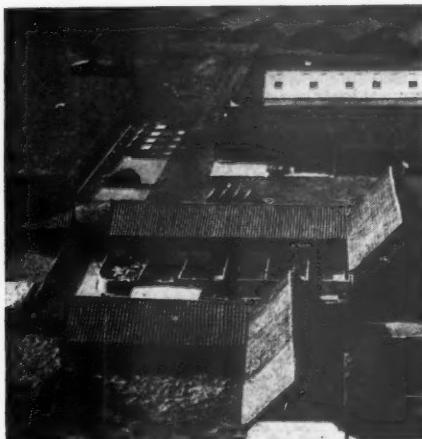
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EDITORIAL OFFICES

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Early Fat Lamb in Devon

C. DIBB, B.Sc., DIP. AGRIC.

National Agricultural Advisory Service, Honiton

With a combination of climate, modern management and inherent skills, Devon producers will continue to supply high quality, early fat lambs for the benefit of others and profit to themselves.

In a county as varied as Devon, it is not surprising that many different patterns of farming have evolved. These are in turn reflected in the different breeds and crosses which together make up the one and a quarter million sheep within the county, kept under very varied systems of husbandry.

Of particular interest are those breeds which, under correct management, will lamb in the autumn or early months of the year and produce fat lambs in early spring. The breed most commonly thought of for early fat lamb production is the Dorset Horn, a breed long recognized for its ability to lamb out of season. Lambs born in September grow well on the plentiful milk supply and are ready to meet the Christmas fat lamb demand. It is more usual, however, to lamb down from October to December and have fat lambs to market from January onwards. Pure bred flocks of this breed are to be found in south and east Devon, particularly in the Exeter locality; they are often crossed with a Dorset Down ram to give a fleshier lamb.

Ewes of the Dorset Down breed will lamb in November and December and, exceptionally, even earlier, and like the Dorset Horn, some ewes will take the ram and conceive within a few weeks of lambing. Although prolificacy is not very high and the milk supply is often not very plentiful, the carcass quality is good, being in this respect akin to the Southdown but rather larger. Ewes of Dorset Down type are common in east Devon, and rams of this breed are the most popular sires for fat lamb production in the county.

Some fat lamb producers try to combine the virtues of both the Dorset Horn and Down by using rams of each breed in alternate years and retaining the ewe lambs as replacements. Cross-bred ewes from Dorset Horns, either with Downs or other breeds, appear to inherit the capacity for early lambing.

In the south of the county, the large long-wooled South Devon is popular as well as another local breed, the Greyfaced Dartmoor, which has a close affinity with the longwools. Both these breeds commonly lamb in December and January and are often crossed with the rather larger Down rams, to give a sizeable but good quality lamb.

In the north of the county, the commonest breed is the Devon Closewool, originating from a cross between the Exmoor Horn and the Devon Long-wool. Whilst generally kept as a grassland sheep to lamb in March, ewes of this breed will lamb in December and January if required and the cross with a Down ram yields a small, high-quality fat lamb.

Thus, within the county, there are a number of breeds and crosses capable of lambing sufficiently early—the first requirement for spring fat lambs.

The second requirement is an environment congenial enough, even in the depth of winter, for young lambs to thrive. Therefore early fat lamb production is confined to the drier soils in the lower rainfall areas. This com-

EARLY FAT LAMB IN DEVON

bination is found near the coast of east Devon, sheltered from the north by the Blackdown Hills; in the Exe estuary and the lower reaches of the Exe and Creedy; and in the river valleys of south Devon between Dartmoor and the sea. Early lambing also occurs in the coastal areas of north Devon, particularly in the Taw Valley. In all these localities the average rainfall does not exceed forty inches and in places is below thirty inches. Owing to the proximity to the sea, in most winters snow does not lie more than a few days. The value of a free-draining soil is particularly evident when ewes and lambs are folded on root crops. Another factor of great importance is the shelter from driving wind and rain which ewes and newly born lambs can obtain behind the solid protection of a Devon field bank.

Drier soils and lower rainfall are conducive to some arable farming as well as winter lambs, and in the main the early lambing flocks are on the larger farms of over 100 acres, with a proportion of corn, roots and leys. Mixed stocking with sheep, cows and store cattle is the rule, with sheep representing about one-quarter of the total animal units on the farm. Flock size is variable, with the average rather less than one hundred ewes.

Grass is not enough

In the mild, moist autumn weather grass growth continues until the New Year, particularly on leys, and it is not usual to feed any roots before lambing. After lambing, however, with a milk supply to be maintained, grass alone is not enough. It is usual practice then to introduce hay, roots and green crops which are fed right through until April.

The traditional root crop is swedes. These are sown as near Midsummer Day as possible and by the turn of the year ought to yield fifteen tons of milk-stimulating feed per acre. The tops, too, are valuable for the lambs, giving a palatable and high protein feed. On the red soils however, utilization by sheep may have to take second place to cashing in on the high returns from swedes for human consumption.

Thousandhead kale is becoming increasingly popular, either as an alternative to swedes on land infected with club root or grown as a mixed crop of three drills of kale and one of swedes, which facilitates folding. More recently, interest has been shown in the extremely leafy Canson kale, which in experimental work in east Devon has outyielded swedes through the winter. Other greencrops include white turnips and rape for the early winter and hungry gap kale for early spring. Many of these are catch crops after silage or hay cuts, or growing on the residual fertility after early and second early potatoes, or after corn. Other forage crops include autumn-sown vetches, either straight or with oats for April grazing. Rye and ryegrass, crimson clover and ryegrass, or ryegrass by itself are sown in August and September after grass or corn, to provide keep for those lean months of March and April, when the lambs are eating as much as the ewes. And when other foods are finished and grass slow to come in a cold dry April, the value of a clamp of mangolds cannot be overestimated.

The time-honoured practice of folding sheep on roots has largely disappeared from most of the country. But it is still retained in the early lamb producing districts of the south west as a means of rationing valuable winter foods, and ensuring that the lambs get first bite by creeping forward

EARLY FAT LAMB IN DEVON

into the unenclosed crop. On some of the heavier soils, swedes are pulled as required and fed on grass and, very occasionally, they are pulled and clamped for later use.

Concentrates are invariably fed to the growing lambs from about one month old, generally in troughs in the forward creep if folded, otherwise in ewe-proof pens or shelters.

Feeding ewes with concentrates before lambing is increasingly popular, to avoid the drop in condition conducive to pregnancy toxæmia. This supplementary feeding also helps to produce that innate vigour in the newly born lamb which gets it on its feet in an inhospitable world.

Thus the third requirement for early fat lamb production is a good supply of bulky foods for the winter and early spring to produce milk from the ewes and, with additional concentrates, to give a quick weight increase in the lambs.

General management

Some of the management problems associated with a winter lambing flock are best illustrated with a specific example.

Bonehayne Farm, Colyton is situated in the valley of the River Coly, about five miles from the sea at Axmouth. During the six years that he has been in occupation, Mr. G. W. J. Miller has brought eighty acres into a corn-roots-ley rotation, whilst improving the remaining hundred acres of permanent grass. Dairy cows numbers have increased to forty, with all calves reared for replacements or beef. A flock of pedigree Dorset Downs has been increased to one hundred. Since July 1958, all ewes have been recorded by the Devon N.A.A.S., originally as part of a survey of fat lamb production, and latterly as an investigation into the techniques of recording.

One major problem has been to avoid having the ewes too fat when they are tupped in early July for December lambing. The 1958-59 lambing period spread over eleven weeks when no flushing technique was adopted. In 1959-60 the ewes were confined to a yard with some limited grazing before flushing and the flock lambed within five weeks. A short lambing period obviously reduces management and feeding problems, as well as inspections in the small hours of the morning.

Concentrate feeding begins in November. Lambing takes place in the sheltered fields near home; no pens or other shelter are provided as these communal lambing places are conducive to joint-ill. Careful shepherding at this time ensures that no mis-mothering occurs, particularly in the case of the younger ewes. Foxes are the cause of occasional losses, and no easy way of preventing them has been found.

Five acres of swedes and kale are grown for feeding in February and March with eleven acres of autumn-sown ryegrass to supplement the spring growth of leys. Lambs and ewes are treated against stomach worms. After some *nematodirus* symptoms in the spring of 1960, lambs born in December 1960 will run on leys and ryegrass which have not previously carried sheep for twelve months. Ewes are dosed against liver fluke.

At one time, orf (contagious pustular dermatitis) was troublesome in the flock. One of the worst possible sights in fat lamb production is to see a lamb with blistered mouth vainly trying to suck from a sore udder full of

EARLY FAT LAMB IN DEVON

milk. The whole flock has now been vaccinated against orf and replacements are treated annually.

Losses of ewes have been less than five per cent and mainly due to in-lamb ewes getting on their backs.

The first lambs are ready to go by the end of March and the majority have been sold by mid-May except for ewe replacements and a few ram lambs for sale. Carcass weights are from 35–40 lb and of the high quality associated with Dorset Downs.

Costs, returns and margins

Any discussion on profitability must start with an appreciation of the variation in physical factors of production. For example, breeds vary widely in lambing percentage, milking ability and weight of wool shorn. Fat lamb prices fluctuate from Christmas to Easter, with a marked fall in May. Costs of production of roots and greencrops depend on whether they are main crops or catch crops. Therefore the following budget of average figures must necessarily be examined with some reserve.

Gross Output and Variable Costs per 100 Ewes put to Ram

	£	£
RETURNS FROM SALES		
Lambs, 110 x 40 lb, at 4s. 3d.	935	
Cull ewes, 25 at £4	100	
Cull rams $\frac{1}{2}$ at £6	4	
Wool, 95 fleeces at 45s. each	214	
 Total Return	 1,253	
LESS		
Cost of flock replacements:		
30 ewes at £10	300	
$\frac{1}{2}$ ram at £30	20	
	 —	320
 GROSS OUTPUT	 933	
 LESS VARIABLE COSTS		
Concentrates: 50 lb per ewe		
21 lb per lamb	} 66 cwt at £28 per ton	93
Hay: 50 cwt at £10 per ton	25	
Roots: 6 acres at £20 per acre	120	
Miscellaneous expenses at 15s. per ewe	75	
	 —	313
 MARGIN to cover labour, overheads, cost of grazing and profit	 620	
MARGIN per acre assuming		
36 acres grazing, 2 acres hay, 6 acres roots (total 44 acres)	14	

The greatest influence on the margin per 100 ewes is the lambing percentage; a rise of 10 per cent from 110 to 120 per cent increases the output by £85, while the food costs only rise by £6. An increase in the wool clip of 1 lb per ewe increases the output by £21. The margin per acre is also influenced by the intensity of stocking, rising to £19 when the grazing area is reduced to 25 acres, giving a stocking rate of 3 ewes per acre.

The future

The returns from winter lambing with additional costs of roots and cake may not be more attractive than from spring born grass-fed lambs from more prolific breeds. Nevertheless the advantage of selling in a time of demand rather than in a possible glut must make the winter lambing a better proposition where it can be effectively practised.

Ways of increasing efficiency must be studied if margins are to be maintained and increased. The importance of breed and selection within a breed for prolificacy, as well as flushing and feeding techniques, require attention.

The level of concentrate feeding is a subject on which more information is required. Costs of production of winter feed can possibly be cut by heavier yields; precision drilling of roots and greencrops may cut labour requirements. Creep grazing on grass, as well as roots, plus intensive grassland management may release land for cash cropping, or enable the flock to be increased. Thus progress will become practice and new techniques traditional.

Some of the information in this article is derived from Report No. 115, Fat Sheep Production in Devon, 1957-58, published by the University of Bristol, Department of Economics, Bristol II Province; and from the Fatstock Marketing Corporation, Taunton. Results at Bonehayne Farm, Colyton are quoted by kind permission of Mr. G. W. J. Miller. I also acknowledge the help of my colleagues in the Devon N.A.S.

Wet Weather and Soil Fertility

J. WEBBER, B.Sc.

National Agricultural Advisory Service, Yorks and Lancs Region

Last year's long-continued rains have made many farmers worry not only about immediate difficulties but also about their future crops. Mr. Webber offers some reassuring news and practical advice.

There are many facets to what is generally described as soil fertility, and three of these—physical condition, lime status and plant nutrient content—will be considered here as the things likely to have been most affected by the weather.

Under continual heavy rain the soil becomes waterlogged and may even be flooded. In extreme cases, especially in hilly districts, it may actually be washed away. The rain will in many cases break down the natural crumb structure of the soil, while flooding and the efforts of farmers to get root crops out or even to plough the land in preparation for the spring may make matters worse. The chemical composition of the soil may also be affected; lime may be lost, and a tendency to soil acidity develop. Plant nutrients, especially nitrogen, can also be lost through drainage.

Physical condition

The appearance of the land now, in midwinter, will be a major cause of worry to many farmers as they look over their sodden fields. On heavier land,

WET WEATHER AND SOIL FERTILITY

early ploughing is essential if frost and wind are to produce the "frost mould" which is so desirable for the easy production of a good tilth in the spring. This year much of the land will, of necessity, be ploughed late and the production of a good tilth on the heavier soils will be difficult.

Crops sown on a poor seedbed, especially if late, as it may well be in many cases this spring, will require extra fertilizer to achieve the best results. Phosphate, in particular, is important in encouraging faster development immediately after germination in wet or cloudy soils, where growth would otherwise be slow. Nitrogen will also be important as an aid to rapid growth.

In many of our chief arable areas the land has been waterlogged for a long time and the structure of lighter soils has broken down. Under the action of continuous rain the surface soil has in many cases turned to a slurry, and water tends to stand for long periods in depressions and hollows. Below the surface there is usually a compacted zone, where the pore spaces in the soil have been filled in by finer material washed down from above. This condition is particularly prevalent in soils low in organic matter which have been under continuous arable cultivation.

Such soils will have lost some nitrogen due to leaching, and during the late summer and autumn further losses may have occurred through denitrification. Without enough air the soil nitrates break down into elemental nitrogen or oxides of nitrogen which are readily lost. These soils will be slow to dry out, so that late ploughing and cultivation may be a problem, but because of their lighter texture production of a tilth should not be too difficult. Care will have to be taken to break up the compacted layer with plough or cultivator to permit free root development and passage of water after sowing. Extra nitrogen will be needed to make good losses in this class of land.

Lime

Losses of lime and plant foods due to the extra rain may be less serious than is popularly thought. Lime is, of course, being lost continuously from the soil under the action of water percolating through. The average loss from this cause is equivalent to about 2 cwt per acre ground limestone or chalk per year. Figures for individual fields vary enormously, being greater on well limed, lighter-textured soils and smaller on heavier, more acid ones. The annual loss, for any soil, is roughly proportional to the amount of water percolating through it. The loss of lime in 1960 is unlikely to have been more than twice that of a normal season, so no serious problem arises here. In a few light soils, where sensitive plants such as sugar beet or barley are to be grown, liming may be necessary, however, to prevent the risk of a patchy crop.

Phosphate

Of the major plant foods phosphate is perhaps the one most tenaciously held by soil. Although much of the phosphate used as fertilizer is put on in water-soluble form, it is quickly converted in the soil into less soluble compounds and is washed through very slowly indeed. The loss of phosphate due to the extra rain will be very small.

Phosphate in rapidly-available form is, however, of prime importance to crops just after germination, and on many soils it will be important to apply

WET WEATHER AND SOIL FERTILITY

phosphate fertilizer at sowing for all crops to get good early growth. The use of phosphate may be recommended, especially on heavier soils or for late sowing, even where the soil is so well supplied that in a more normal season none would be advised.

Potash and nitrogen

Potash is also held fairly firmly by soils, except perhaps those of very light texture. There is not the same problem of serious potash deficiency that there was, due in large measure to the heavy use of potash in compound fertilizers in recent years. Normal potash dressings will generally be quite adequate.

Losses of nitrogen may be more important, although we must remember that in normal winters nitrate-nitrogen is almost completely removed from most soils. Nitrogen which remained combined in organic form or even as ammonium (say from sulphate of ammonia) is unlikely to have been lost to any appreciable extent. Conversion of soil nitrogen to nitrate, the form in which it is required by crops and yet is most readily lost, proceeds very slowly when soil temperatures drop below 40°F. Losses will have been very slow or negligible from late November onwards.

The loss of nitrogen from soil will also depend on the level of fertility. Some soils contain good reserves of nitrogen, especially where the land has recently been in permanent grass or a long ley. In such soils responses to nitrogen fertilizers are normally small, and in some cases little or no nitrogen may be required, say, for cereal crops. The loss of nitrogen from soils of this type will not be very important and, since they usually have good structure because of the history of grass, such soils can probably be treated normally in spring.

On other land, especially in lighter soils under continuous arable cropping with low organic matter content, reserves of nitrogen in spring will be small. Here, and these conditions are widespread in eastern England, generous use of nitrogenous fertilizers will be essential. Cereals other than oats will need at least 60 units (3 cwt per acre 20 per cent nitrogen fertilizer) of nitrogen for maximum yield. Even higher dressings may be customary in some areas.

For spring crops, then, normal manuring should generally be adequate. Some crops, especially cereals, which may not otherwise receive phosphate should be given a small dressing at sowing (say 20 units equivalent to 1 cwt per acre 20 per cent superphosphate). Nitrogen dressings should be generous, but should be varied with level of fertility and with climate, lower rates being customary in parts of western England and Wales.

Winter-sown crops

The acreage of winter-sown crops is small, but as a result of the wet conditions many fields will be in poor shape. Waterlogging will have caused the death of plant roots by restricting aeration, while nitrification will also be slowed down in spring for the same reason. When warmer conditions come, crops will need to produce more roots quickly to grow away; where possible a small dressing of water-soluble phosphate should be applied. Harrowing, to aerate the soil and encourage both root development and nitrification,

WET WEATHER AND SOIL FERTILITY

should be carried out as soon as the land will take machinery and implements without damage.

Nitrogen will have been lost here, too, and no further effect can be expected from nitrogenous fertilizers applied at sowing. Nitrogen will need to be used at generous rates, except under the conditions of high fertility mentioned above. Application should be made as early as possible, preferably as a mixed nitrate/ammonium fertilizer such as Nitro-Chalk or Nitra-Shell.

Grassland

Grassland also needs to be considered. Many fields which would have had basic slag in autumn will not have been dressed owing to the wet conditions. Now that spring is coming it will often be more convenient to apply all the plant nutrients required together in order to save time, and if phosphate is needed it could be used as a compound fertilizer. Basic slag applied now can still be expected to give good results, however.

Losses of nitrogen and potash from grassland during the winter are small. Experiments have shown that late summer dressings of Nitro-Chalk or Nitra-Shell are taken up by the grass and can produce appreciable residual effects the following spring. Normal manuring would appear to be adequate, although we must remember that much of our grassland is still badly under-manured, and that on many farms more fertilizer could be used with advantage on this most important crop.

In general, fertility problems this spring will be less serious than may have been feared. The sowing season may be short and there will no doubt be difficulty in getting all crops sown in time, but with generous use of fertilizers there seems no reason to fear a disastrous season in 1961. The good crops grown in 1947 on land which was under water during the flooding as the snow thawed in March are an example of what could happen, given good weather during the summer. A fertile soil acts as a good buffer against extreme conditions whether in winter or summer, and is likely to give good crops.

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Royal Smithfield	London—December 4-8

Should we Plan?

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Continual improvisation does not pay. Mr. Jones shows the advantages of working out a basic plan to suit yourself and your farm.

IN 1831, when Cyrus McCormick was devising and building his first successful reaper, one man on a farm could produce food for $3\frac{1}{2}$ people. Today a man can produce enough for himself and 18 others, and he need not labour from sunrise to sunset to do it, but a farm still needs very careful planning of all sections that govern final production.

Farm planning can be likened to a game of draughts, where a number of strategic moves are made in order to attain an objective. In the game of farming a movement made this year in cultivation, crop, stock purchase or sale can affect the cycle for a number of years. It may be better to defer ploughing a field for a year or two until a neighbouring field comes into the rotation, when the two can be cultivated together, thus avoiding crop handling and machinery movements from two directions on the farm.

A farm must be regarded as a whole, and a progressive farmer will work out a well-knit plan at the outset of operations. If he does not work to a plan he will always be improvising; work will be skimped and neglected, and priority will often be given to jobs of lesser importance. But do not imagine that if one has a plan everything will be easy. Any necessary changes in the system must be carefully thought out ahead and not made on the spur of the moment, and they should bear close relation to the farm as a whole.

The farmer himself

It is well known that a farmer must always be an opportunist, taking advantage of a good period and compromising with a poor one. He may be young or old—a major factor which will affect his whole outlook upon life in general and upon his work in particular. Luckily, all of us have likes and dislikes. A farmer is usually the head of a family who co-operate with him in the earning and spending of the income. He often provides the land he works on, the labour, and the all important capital he uses in the enterprise. Most or many products can be produced on a given farm, but because of climate, soil, altitude and the farmer's skill, etc., some products do better than others in a particular place. The prices obtained for products determine whether they are going to pay well or not, or whether it is worth making a change. The farmer needs to weigh up the pros and cons and choose the product best suited for his conditions.

Stock and crops

The types and numbers of each class of stock and their husbandry will depend largely upon the buildings available for housing them; whether the fences are sheep proof; or whether it is advisable, or necessary, to go in for

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factory enterprises like pigs and poultry. Usually one class of stock will pay better than another, but there is often a limit on the number that can be housed or kept. Lack of buildings, high labour requirements, risks of disease or shortage of winter grazing could be determining factors.

Crops must usually suit the soil, climate and market demands if they are to be for sale. A heavy land farm is not suitable for grazing crops *in situ* in the late autumn or early winter; outlying stock will poach and damage pastures on such a farm, and spring growth will be retarded. Even so, the grazing of crops where they grow and the provision of early and late grazings must receive great attention, as the principles involved in saving labour and other costs have proved so profitable and practicable over and over again.

Sowing and harvesting of crops have to be planned to stagger work and labour needs. The number and type of livestock determine the type and amount of land that will provide litter and grazing. Crops need to be grown so that fertility is not only maintained but increased, if this is at all possible. A sequence of crops should provide a regular cleaning crop upon each field. Freedom from crop diseases and diseases of stock must not be forgotten.

It is very convenient if the number of courses in a rotation is related to the number of fields or blocks of fields on the farm, as it is wasteful and laborious to divide fields. Farmers naturally prefer to have fields growing the same crops near each other to save fencing, movement of machinery and products. Crop sequence should permit flexibility if this becomes desirable.

Use of labour

For efficiency, labour should be well paid, contented, and interested in the welfare of the farm and the quantity and quality of its products. Permanent full-time staff are the backbone of the industry's labour force and planning must provide for the employment of full units of labour, as casual labour is seldom available in many areas. Work must also be made more congenial and the backache removed whenever practicable. The amount of work to be accomplished is the same today as in the past, but the mental approach to it is very different, and the old dignity of human toil is ridiculed by the man who has decided that a machine should do the job.

The proportion of cost due to manual labour has risen in the case of every farm product since pre-war days, and this trend is likely to continue.

The labour requirements for livestock are fairly uniform, but there is variation from one enterprise to another; those for crops on the other hand are very uneven, causing peak demands at sowing, singling and at harvesting.

Machinery

Machines need an expenditure of a very large amount of capital, and unless they are really needed and very effective in the performance of their task, money will be wasted. Mechanization often takes place irrespective of economic considerations; psychological and tax reasons often prevail, and family pressure can also induce a high degree of mechanization on a farm.

Some farm chores have proved difficult to mechanize, as for example the growing of root crops, but even this is not impossible and large strides have been made in this direction recently in the development of potato and sugar beet harvesters, precision drills etc. It must be borne in mind when planning

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that all the hard work of the farm must be done by machine, if at all possible. It is useless to provide machinery, on the other hand, if the user is not well up in the art of handling the equipment and maintaining it in good condition.

Buying new machines does not always provide the remedy; one should make quite sure that the job itself is necessary before thinking of mechanizing it. Simple and cheap mechanization processes are often the most effective. The use of the buck-rake, the electric fence and self-feeding of silage are simple answers to mechanizing farm operations.

Buildings and fences

Buildings and fences are expensive items and, if they exist, full use must be made of them. If they are to be provided, serious thought must be given to their type and location so that they may possibly be adapted for other purposes later on.

A practical application of the facts discussed was adopted in the case of a 134-acre farm which was taken over by a new tenant in the autumn of 1955, when a plan of campaign over a period of eight years was instituted. The farm is in an exposed position on a light, sandy soil and the field boundaries were unfenced earth banks. The fertility of the soil was rather low, and the farm had previously been rather understocked. Thirty-five acres had not been reclaimed from the parent herbage. Everything appeared to need attention at the same time.

The farm buildings are centrally situated just off a main road. They house fourteen dairy cows and their followers, and there is ample barn space on the farm. Mains water is available. The farm was not generally fenced for sheep or cattle and this defect needed primary attention.

Its soil is dry and crops can be grown early and late in the season, and the land will carry stock in the winter. The fields are of convenient size—about seven acres each—without steep slopes to hinder cultivation or harvesting.

At the outset the farmer decided upon broad principles. He made up his mind not to carry more than fifty cattle on the farm at any one time, and to follow a programme that could be carried out with the aid of one employee. Improvements should, as far as possible, be financed from farm production. The problem, therefore, demanded an immediate as well as a long term solution.

Crop needs

To provide sufficient hay for fourteen cows, fourteen calves and twenty-eight other cattle at approximately a hundredweight a week for the cows and half that quantity for store cattle, about forty-five tons of hay would be required for the winter feeding period. This safe estimate should cater very adequately for the whole stock and provide a reserve for the sheep. It should be obtainable from twenty-five acres of land with an average yield of thirty-five hundredweight per acre. The ideal, however, would be to make thirty-five tons of hay and from sixty to eighty tons of silage from the same area of land. Labour demands would thus be spread over a greater part of the season. The silage would replace kale in the ration of dairy cows during the

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late winter. Straw requirements are difficult to estimate, but two hundred-weight a day, a total of fifteen tons for the year, would more than meet all likely needs. To feed a balanced mixture by purchasing proteins for use in the milk production ration in the proportion of 3:1, and to feed the mixture for the first two gallons per cow per day, 6½ tons of home-grown cereals would be required for the winter for the dairy cows. The store cattle up to one year old would need two hundredweight each for the year, and the older cattle three hundredweight each to cover the winter feeding period.

A hundred poultry were to be kept, and their requirements would partly have to be met by grain. Allowing for the demands of the pigs and the ewe flock, at least seventeen tons of home-grown grain would have to be grown. To produce this quantity, from fifteen to twenty acres should be devoted to corn every year.

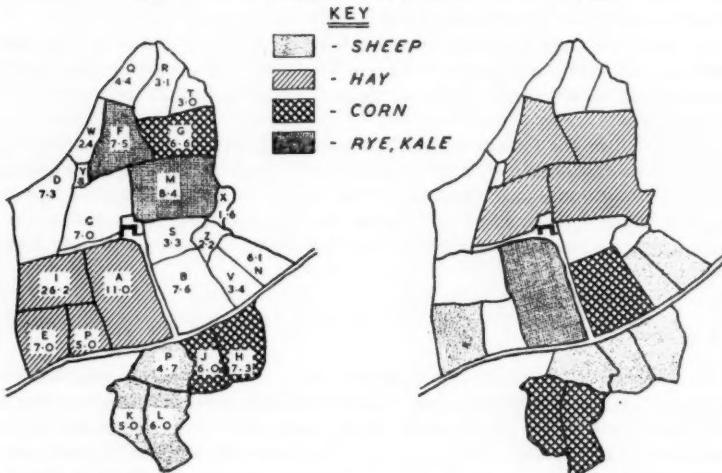
On the subject of grazed kale, which will be a necessity on this type of farm, fifty-six lb per day per cow should be aimed at to cover a period of at least a hundred days. For a herd of fourteen cows, the total quantity would amount to $2\frac{1}{2}$ tons a week, and a total of thirty-five tons would be needed. This could be provided by $3\frac{1}{2}$ acres of kale with a low (ten ton) yield. To provide a surplus which could be utilized by strong store cattle, it would be an advantage to grow approximately six acres of kale each year. This would be summer sown after grass or a crop of rye for grazing.

From the field acreages in the diagram below it will be observed that the targets set should be obtainable with one field of kale, three of corn, and five of hay or silage.

1958

Field and Crop Plan

1962



Units of labour

This proposed stocking and cropping, assuming that the ewe flock would be eighty strong for the first year or two, would create a labour requirement of 7,200 man-hours. Each full-time employee provides 2,500 man-hours a year on average, so the farm labour requirement will be near the output of

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three men. It would be out of the question, therefore, under the system planned to manage with one employee, and it would be an advantage to enlarge the business in order to employ fully three men. Pigs, poultry or cash cropping could provide the subsidiary enterprise. Pigs were decided upon, and a herd of six sows was established at the outset.

As the farm, with improved management, was likely to provide too much feed for the proposed stocking, the surplus could be utilized by increasing the ewe flock, and the labour requirements could be kept within the proposed complement.

Field plan

The sequence of fields to be ploughed and the rotation of crops were determined to provide feed for the stock, and stress was placed on the provision of early and late grazing, together with the provision of enough mid-season grass from direct reseedings to counteract the possible effects of summer drought. Good husbandry and an increase in the general fertility of the farm had to be catered for. The rotations were prepared so that they would be flexible enough to allow for a change in policy and an interchange of fields from one rotation to another if the need arose. To attain these objectives the fields were grouped into three blocks and allocated to three rotations, to run concurrently.

Group 1: Ley—rye—kale—corn and seeds—six years ley. A, Al, B, F, C, M, G, I.

Group 2: Ley—corn and Italian ryegrass—corn and seeds—six years ley. N, H, J, P, L, K, E, WQ.

Group 3: Oddments for direct reseeding every eight years. R, T, D, O, S, Z, X V.

The accessibility of the fields was taken into account in deciding on enclosures to grow kale for grazing; the corn growing rotation was positioned in the distant fields, and confined mainly to the fields commonly grazed by sheep and store cattle. As fencing was a major item of cost with the keeping of Welsh Mountain ewes, and particularly so on this farm, some fields will be utilized as a group. The sequence in which fields enter the rotation required considerable thought, to avoid poaching of new seeds by cows on their way to the kale field in the winter. The poorer enclosures had to be treated at the outset to provide quick and major improvements. An attempt has been made to plan so that the fields to be mown adjoin each other and so that the fields cropped for corn are close together, to save movement of man and machines and reduce the amount of fencing required.

The rotation of crops may not be ideal in the light of modern trends, but it was put forward to meet the wishes of this farmer, who desired to concentrate on an old-fashioned farming system using good husbandry and a mixed enterprise.

Fertilizing and seeding

The key to the fertilizer treatments adopted is in the application of lime and the basic manurials, phosphate and potash. Lime was recommended to meet requirements, phosphate in liberal doses and potash applications in moderation. Nitrogenous and complete fertilizers were advocated for the provision of out-of-season grass and additional grass as and when needed.

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A sum of £4 per acre would be spent on fertilizers during the first four years. The land seeded down, the young leys and the rye and kale crops were liberally treated and given priority.

A variety in the seeds mixtures used was aimed at; ryegrass and white clover, and ryegrass, timothy and white clover were the basis for grazing leys, whilst mixtures of the Cockle Park type were recommended for land to be mown. The use of non-ryegrass mixtures is also under consideration.

Success

At this interim stage it is safe to say that the plan has proved a success, and that it has been effective in building up the fertility and potentials of the farm, as well as providing a satisfactory income in the meantime. The stocking figures for 1956 and 1960 are shown for comparison:

Dairy cows	14	18	Ewes	90	230
Other cattle	40	59	Sows	6	9

The cattle are mainly Friesian type, and all the calves born are reared. The cattle do not leave the farm unless they are a finished product, that is, beef or in-calf cows or heifers. All the cross bred lambs are fattened, and the majority of them leave the farm by early June each year. The sows are kept to produce weaner pigs, but occasional lots are fattened to pork weight if accommodation is available. The farmer and his two servants are fully employed, and crop yields have been well above the estimates.

The reactions of the farmer pinpoint effectiveness in this important aspect of our daily duties. In this case he was enthusiastic at the beginning and soon developed keenness, and now he is continually on the look-out for any new practices or variations in systems that we can recommend. He stresses the number of pitfalls that have been avoided by careful planning beforehand, and the ease with which the farm work is done. As effective farming in this small acreage group is so allied to the result of hard work by the farmer himself, much of the credit goes to the executor of the programme. But this does not at all belittle the need for successful planning.

★ NEXT MONTH ★

Some articles of outstanding interest

LAMBS WHEN DESIRED by Allan Fraser

FARM CIRCUIT SCHEMES by E. G. Baker

A BETTER RASPBERRY CROP by David H. Turner

AVOIDING LOSSES IN CALF REARING by Walter Smith

Attitudes to Farm Labour Economy

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This article, is based on an investigation into the economic importance of financial incentives at present being carried out by the University of Durham.*

SIXTY-THREE farmers in Northumberland and Durham have recently been questioned about differences in some of their attitudes to labour management, and in the ways in which they try to keep down labour costs.

All of them make it clear that they attach the greatest importance to labour costs. Forty-four per cent considered them to be the most important single factor influencing the profitability of their businesses.

Farmers considering the under-mentioned factors of most importance to the success of their farm businesses

	per cent
Efficient labour use	44
Better buildings and equipment	10
General organization	10
General management	13
Factors affecting output	13
Efficient marketing	10
	<hr/> 100

All the factors considered to be most important to success are concerned with six main objectives, and efficiency in the use of labour and capital, good organization and management, efficient marketing and the need for a satisfactory output were all mentioned as being particularly important.

In view of the widely-accepted importance of reducing labour costs, it is of interest to know the values that these farmers attach to different ways of achieving this.

Number of farmers stating indicated order of importance

Stated order of importance	Further mechanization	Improvement to buildings	Improvement to farm layout	Changes in work methods	Changes in cropping and stocking	Greater reliance on casual labour	Overtime	More work done by contractors
1	27	18	5	7	4	—	2	2
2	8	17	14	5	6	2	—	1
3	7	11	10	10	17	7	5	5
4	7	6	10	11	8	6	7	5
5	4	3	9	14	8	9	8	4
6	2	2	2	8	5	9	19	6
7	1	1	4	2	3	14	10	15
8	1	—	4	—	5	10	6	20

* *Attitudes to Incentive Schemes and their Importance in Agriculture*. Report No. 144G.
Department of Agricultural Economics, King's College, Newcastle upon Tyne.

ATTITUDES TO FARM LABOUR ECONOMY

Of eight possible ways of saving labour, the greatest number consider further mechanization to be most important, whilst the next greatest number think improvements to their farm buildings would offer more scope.

It is not possible to be sure which method these farmers think would offer the most scope for improvement on the sample of farms as a whole. They seem to expect most improvement from further mechanization and the provision of better buildings, but collectively they attach only slightly less importance to changes in cropping and stocking, in farm layouts and in work methods.

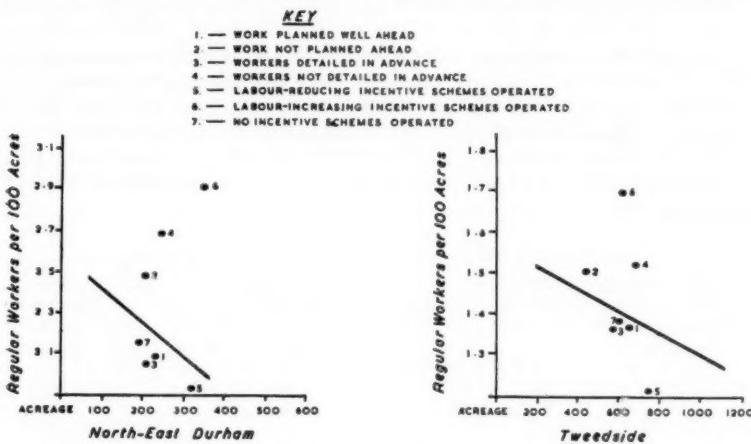
The majority think that greater reliance on casual labour, on overtime, and on the services of a contractor offer little or no chance of reducing costs.

In trying to keep down labour costs, better labour management may offer as much scope as organizational changes of the type discussed. Little has been done to discover just what this involves, so that even today good labour management must be looked upon as an art rather than as a science. However, it is not difficult to find major differences in approach which indicate wide differences in farmers' attitudes to labour management.

Farmers were asked whether they planned jobs in advance in some detail, whether they planned each day's work in advance and detailed their men that morning, and whether they operated any incentive schemes.

The replies received, when related to regular labour requirements on each farm, do suggest that farmers who plan ahead and are willing to operate incentive schemes may be considerably more efficient in their use of labour.

The sample of Northumberland farms was drawn from Tweedside, and employed an average of 1.4 regular workers per 100 acres. On the Durham farms 2.2 men per 100 acres are employed. Apart, however, from unknown



variations due to differences in intensity, average labour requirements vary simply because of differences in farm size. As far as possible this is taken into account by the slopes of the two lines in the figures, each of which shows average regular labour requirements per 100 acres on farms of different sizes.

ATTITUDES TO FARM LABOUR ECONOMY

There is of course some tendency for the farmers who plan jobs ahead also to plan each day's work in advance. To this extent the suggested importance of each of these alternatives in the figures is exaggerated. Even so, their importance together may be quite considerable.

In neither Tweedside nor Durham is there any marked tendency for the importance attached to forward planning to be associated with farm size. This is not surprising. In neither of the two areas is the average size of the sample farms much below 200 acres, and on both medium and large farms most farmers try to plan ahead.

The figures also suggest that although the detailed planning of jobs in advance may be of great potential importance, control of the day-to-day work, and of labour, is at present more effective in reducing labour costs on these farms.

There are considerable differences in the average amounts of regular labour used by farmers operating and not operating labour-reducing and labour-increasing incentive schemes. These differences do not measure the incentive effect of the schemes operated, but rather show that their incentive effect plus the greater importance attached to efficient labour use by the farmers operating them appear to have a marked effect on labour costs.

Without knowing the outputs and incomes obtained it is not possible to say how far these farmers are justified in their aims, but certainly those offering incentives which encourage it are achieving more intensive labour use. Likewise, somewhat less than the average amount of regular labour seems to be required by the farmers who operate labour-reducing incentive schemes. In the Durham area, however, this may be due more to the greater average size of the farms on which incentive schemes are operated, and only in very small part to the effect of the schemes.

This again is not surprising. The schemes at present operated, particularly in Durham, are very limited in scope, and in many cases offer workers the opportunity of earning only small amounts over their regular wages.

It would be much more surprising if they had a greater effect on labour use than the data suggests, and in fact none of the farmers in question regard their present very limited use of incentives as important to labour costs.

What evidence there is suggests that, despite the difficulties associated with applying incentives in agriculture, their advantages outweigh their disadvantages. At worst they may be of little or no use in reducing labour costs; but if planned carefully, and applied to a much wider range of jobs, they could effectively reduce these costs, and enable agricultural workers to obtain substantially higher earnings.

Streamlining a Mixed Arable Dairy Farm

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Can a change to loose housing and parlour milking be justified on the medium-sized mixed arable farm? The experience of one North Cheshire farmer spotlights the problems and suggests an answer.

THE system of farming practised by Mr. Harold Woodcock on the 140 acres of Avenue Farm, Comberbach, near Northwich, is typical of the district. The soil varies from medium to strong loam, and 18-20 acres of potatoes are the key crop, divided between early, second early and early maincrop varieties. Part of this land is catch-cropped with kale, and part sown with winter wheat. Two more cereal crops and a four-year ley complete the rotation. Milk production is the main livestock enterprise, and the majority of the herd replacements have been home bred by A.I., though a beef bull has been used during the past year.

Until autumn 1959, the dairy herd of 38 Friesians was housed and milked in two shippsons, one double-rank head to head and one single-rank, separated by the meal house. The dairy was across the yard. Silage was made with a green-crop loader in a trench silo under a lean-to from the Dutch barn. Although this was close to the shippsons, the silage had to be barrowed in from a trailer. Washing dairy utensils was done by a woman part-time, and a lad was employed at weekends to help around the yard.

Although the number of cows per 100 livestock acres was above average, Mr. Woodcock felt that the farm could support up to 50 if the accommodation could be provided economically and the routine work simplified. A check of the records showed that a true average yield of 1,050 gallons had been achieved with a concentrate use of 38 cwt a cow. It was estimated that a yard-and-parlour conversion could be done for under £1,500. Some 10 acres of cereals would have to be sacrificed to provide extra grass for 7 cows, and maintenance for a further 5 cows would come from the use of extra fertilizer. A budget for the change was then drawn up:

Table 1

<i>Extra Costs</i>	£	<i>Extra Income</i>	£
Bought feed for 12 cows	720	Milk from 12 cows, 12,600 gal at 3s.	1,890
Depreciation on 12 cows	120	Extra calves	60
Extra fertilizer	50		
Interest on £1,500 at 6 per cent	90		
<i>Income lost</i>		<i>Costs saved</i>	
Produce of 10 acres oats	280	Seed oats	40
	1,260		
Extra net income	730		
	1,990		1,990

The choice of a parlour was governed by the dimensions and layout of the
622

STREAMLINING A MIXED ARABLE DAIRY FARM

single-rank shippon to be converted, and by the necessity for quick throughput at busy seasons. Time also had to be allowed in winter for high yielders to eat their full concentrate ration. A six stall, four unit two level abreast parlour was installed, and two extra units added later to speed up milking; idle machine time is not considered important. Recording is by measuring jar and the milk piped to a new and adjacent raised dairy. There is a holding pen near the cow exit. The existing Dutch barn provided 35 sq. feet bedded area per cow, and the space between it and the parlour was covered and concreted as a feeding and loafing area, with racks for fodder. Concentrates are delivered in bulk to a loft over the meal house, from which an electric auger fills the parlour hoppers. The cost of this conversion is given below:

Table 2

	£
New lean-to and concrete area	380
Parlour conversion and dairy	570
New middenstead	150
	<hr/>
	1,100
<i>Less Farm Improvement Grant</i>	370
	<hr/>
Parlour milking and dairy equipment	730
Gates, water trough, racks, feed auger	360
	<hr/>
Total net cost	1,240

The parlour was ready on 5th October, 1959. The cows quickly became accustomed to the new routine, and results since then have fully justified expectations. A "before and after" comparison of the time spent in tending the herd during the silage feeding period is interesting:

Table 3

1958-59 (shippons)	Man-hours	1959-60 (yard-and-parlour)	Man-hours
Morning milking. 2 men	3½	Morning milking. 2 men	2½
Evening milking. 2 men	3	Evening milking. 2 men	2½
Cleaning out shippons. 1 man	1	Cleaning parlour and equipment.	
		1 man	½
Loosing cows, bedding down, tying up. 1 man	1	Straw up yard, clean concrete.	
		2 men	1
Morning silage cutting, carting and feeding. 2 men	2	Morning silage cutting, carting and feeding. 1 man	½
Evening silage carting and feeding. 2 men	½	Evening silage cutting, carting and feeding. 1 man	½
	<hr/>		<hr/>
	11½		7½

The benefits of the system are not confined to the winter months. The lad previously employed for 5 hours at weekends throughout the year is no longer needed, saving £37 10s.

A change was made in 1960 from green-crop loader to flail forage harvester, using one tipping and one moving floor trailer and buck-raking the grass on to the silo. One man is now free to grease and prepare this equipment and fuel tractors before breakfast, a job previously done by a casual employee who was taken on during silage-making to drive the tractor hauling the green-crop loader. His wages have consequently been saved. In 1960, 39

STREAMLINING A MIXED ARABLE DAIRY FARM

acres were mown for silage between 19th May and 6th June (16 working days), compared with an average over the previous three years of 30 acres in 20 working days, finishing by 13th June. A higher-quality product can therefore be expected in future.

In 1960 also, a potato haulm pulverizer was bought. One of the regular staff now takes this out before breakfast and knocks the tops off the drills to be lifted that day. This has eased the work of potato lifting considerably. Previously this employed Mr. Woodcock, his regular force of 3 men and a gang of 4 women pickers, and also children in the school holidays. The work is now handled by the regular staff with two women, and children are no longer needed.

Table 4 sets out the figures for milk production and feed use for the years 1958-59 and 1959-60. A regular monthly check of feed used against milk

Table 4

	No. of cows	Gallons sold	Sales per cow (gallons)	Total concentrates (tons)	Concentrates lb per gal
1958-59	38	40,625	1,070	72	4.0
1959-60	40	43,306	1,080	81.5	4.2

produced has shown that further economies can be made in this direction without loss of yield. As a result of the change of system, drudgery has been reduced and a number of improvements made in the organization of seasonal work by putting the time saved to good use.

Starling Roosts and their Dispersal

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The roosting habits of the starling are examined, and methods described which have usually cleared roosts in three or four days.

DURING the last seventy years the starling, which is well known in town and country alike as a jaunty, quarrelsome bird, has been on the increase in Britain. The population consists of both residents and migrants, great numbers arriving in the autumn from Northern Europe, especially the Baltic and Scandinavia. It is, therefore, in the late summer, autumn and winter that the largest flocks occur and are likely to be most troublesome.

It is common knowledge that many thousands of starlings leave their feeding grounds each evening and fly in to city centres to perch on the ledges of buildings, the letters of neon signs, street lamps, statues, monuments and the trees in parks and streets. A roost may receive birds from all parts of an area, and each evening they may be seen heading towards the roost in small parties of 20-30 from distances of 15-20 miles. These join up with each other, so that when they reach the area of the roost the flocks may contain more than a thousand birds.

STARLING ROOSTS AND THEIR DISPERSAL

Other flocks roost in young forestry plantations, particularly those of 10-30 years' standing. Trees of this age provide the right-sized branches and are a suitable height above the ground; the birds pack themselves on to the trees, shoulder to shoulder, so that the boughs bend under their weight. These plantations, whether of hard or soft woods, are at a vulnerable stage of growth, and damage by large flocks of starlings can result in severe financial loss. The weight of the birds on the branches, and in particular the pressure occasioned when they all fly off in the early morning, may break the boughs; and the accumulation of droppings over several years may eventually kill the trees. The young woods are frequently used as game coverts, and the presence of large numbers of starlings may result in the dispersal of game birds to less favourable areas.

During the last few years, many attempts have been made to disperse these large flocks into smaller groups so that the likelihood of damage is lessened. It has, however, proved difficult to break up flocks of birds whose natural behaviour is to congregate in large numbers, but nevertheless reasonably satisfactory methods of moving a flock from a roost have been devised. These can be useful if a flock chooses to roost in valuable timber because the birds can be moved to a site where they can do less damage. Some woods in an area are favoured by starlings each year, though certain weather conditions may cause the birds to move of their own volition.

To understand the correct use of any dispersal method, the roosting habits of starlings must first be appreciated. On fine nights, the first flocks will approach the roost shortly after sunset. Many of these birds will alight on tall trees and hedges within half a mile of the roost, keeping up a constant chattering. Eventually thousands will have gathered, and some will feed in fields around the roost; they may do damage to young tender plants of winter wheat. Suddenly the chattering ceases, the birds rise into the air and fly in a long stream to the roost. Any late-comers fly to the roost direct. On very windy or wet nights the birds do not go through this pre-roosting behaviour, but fly straight to the roost. Their flight under these circumstances is very low and undulating and they will enter the wood, perhaps only a few feet above ground, after flying in over hedgerows to keep out of the strong wind.

Use and cost of fireworks

Two methods of dispersal have met with some success; one relies on noise, and the other on smoke and noise.

The equipment needed for dispersal by noise is easily obtained. Firework rockets of three types are important, but must always be augmented by shot-guns, football rattles, dustbin lids and, in fact, any thing which will make a loud "background" noise. The background noises must be made within the roost, from the time birds appear until dark. As the starlings fly in they sheer off and circle the wood, making repeated attempts to land and becoming more and more alarmed. By the time darkness falls, no amount of noise will scare them away and finally quite a high percentage of the flock will come to roost. On successive nights fewer and fewer birds approach, but watch should be kept for at least a week to ensure that any arrivals have a noisy reception. The more people who can be deployed about a roost to create these noises, the more effective the operation.

The fireworks are used to scare the flock as they approach the roost. Three

STARLING ROOSTS AND THEIR DISPERSAL

kinds have been tested: "shrapnel bags" costing 7s. 6d. each; "shrapnel rockets", 5s.; and "flash rockets", 1s.

Shrapnel bags must be placed in a short pipe or mortar before being lit; when ignited the firework rises approximately 24 feet into the air, giving a series of short, sharp, very loud bangs. They are best used within the roost and lit as the birds come in. The noise, accompanied by frequent shot-gun fire, will frighten the starlings into staying in the air. If the roost covers more than an acre or two, the best results are achieved by having several operators, each with a small supply of shrapnel bags to light when necessary.

Shrapnel rockets and flash rockets should be fired from well outside the roost. The launching site should enable the rocket to be directed at the flock as it comes in. This can be achieved in two ways, either by holding the rocket stick in a length of conduit tubing passing through a piece of asbestos at least 18 inches square, to act as a flash plate, or by placing the rocket stick through two staples on a wooden stake which can be driven into the ground at the required angle. The shrapnel rockets explode at about 300 ft with one bang, followed by a series of short sharp crackles. Both types should be fired to explode among the flock as it approaches the roost.

The combined effect of noise and fireworks will deter birds from settling in the roost. Many will attempt to fly in at unguarded corners of the wood, near to the ground, but provided it is not too dark these can be dislodged by hand clapping, shouting, and banging.

Smoke

Similar effects can be obtained by substituting the smoke from fires for rockets. This is, of course, a much cheaper method, and provided the fires are properly handled is perfectly safe. Birds dislike flying in fog, and if it is possible to cover the wood with a screen of smoke in time they will not attempt to land, especially if there is a background noise as well.

Open bonfires can be used, but these take up a lot of space and can be dangerous, especially on a windy night. A better method is to light fires in five-gallon oil drums with holes punched in the bases and sides. The drums should be raised a few inches off the ground to let air pass beneath them, and as many as possible should be used to ensure complete coverage of the wood with smoke. The burning of oily rags gives the densest smoke, and this can be further increased by the addition of paraffin-soaked rags and saltpetre.

Once again the importance of noise, even in this method, must be stressed. Visits should be made to the wood every night for at least a week, and either method put into practice if birds appear. Noise alone might clear a small roost, but it would be more effective combined with smoke.

In most of the cases which have been tried, intensive efforts have cleared a roost by the fourth night.

These are methods which have succeeded in moving a flock from a roost, and they are undoubtedly worth while if the timber is valuable or game in danger. Large flocks of starlings have been known to kill plantations and thickets by roosting in them regularly for two or three years. When a wood is being used as a regular starling roost few other birds will inhabit it, let alone nest there. In spring, however, the starlings desert the roosts, the migrants return to their native countries and the British residents split up into breeding colonies.

Turkeys from Small Beginnings

JOHN L. JONES

Mr. T. R. Pierce took up turkeys as a sideline only ten years ago. Now they are his main enterprise, thanks chiefly to a constant pre-occupation with the economic side of production and his feeling for livestock.

DESPITE its notorious foibles, the turkey is an accommodating bird which will live outside, or indoors in low-cost improvised or existing buildings and, thanks to modern disease specifics, thrive in what would have been quite unsuitable environments twenty or thirty years ago.

The turkey enterprise developed by Mr. T. R. Pierce on the 200-acre Abbotside Farm, near Wotton under Edge in Gloucestershire, exemplifies how a progressive and efficient business can develop from small beginnings with very modest capital expenditure but with good stockmanship and a genius for improvisation. Mr. Pierce first looked to turkeys about ten years ago, when seeking a sideline that would provide income and also quantities of muck for his light land dairy farm. He began with one pen of American Mammoth Bronze. The following year he changed to two pens of Broad Breasted Bronze, which threw up two white sports that bred true. Today the once modest sideline virtually dominates the farm, and the breeding flock is rising this year to 2,000 birds, of which only about 10 per cent are Bronze.

Progress at Abbotside has been guided by two aims: top quality end-product and economic performance, and rock bottom capital costs. Recording and hard selection have achieved the first; farm-cut timber, second-hand galvanized sheet, wire netting and the use of second-hand army huts the second. The principal sales are now of breeding stock, but table birds are also produced in numbers, and a retail trade has been built up locally as a buffer against fluctuations in wholesale prices.

Mr. Pierce believes that for the highest profit the table turkey must go off the farm at an early age, ideally 16 weeks for hens and 14 weeks for cocks, with a good weight for age and the best possible food conversion and, of course, carcass quality. This is the criterion by which the breeding birds are all progeny tested. The pedigree breeding section are all trap nested, and the eggs recorded. The poult are wing-banded. They remain in the brooder houses for 6-8 weeks, in pole barns for another 4-6 weeks and are then drafted into wired compounds without shelter or roosts and on to range. This is intended as drastic screening for hardness.

Selection is based on performance. All potential breeding stock are weighed at 10, 16, 20 and 24 weeks. Choice of breeders takes account of weight for age, width of breast, which must be a minimum 5 inches, length, egg production and early hatching. Both stags and hens are subjected to the same tests. Hens must have attained a minimum of 16 lb live weight at 24 weeks and stags 24 lb. It is notable that the birds that record the highest weight for age always record the best food conversion rate, which at the present is averaging 2.9 to 1.

Extreme care is taken in breeding for the right shank length in the stags, as previous over-emphasis on breast width had an adverse effect on fertility.

TURKEYS FROM SMALL BEGINNINGS

Artificial insemination is used as a complement to natural mating. Poult hatching begins in February and continues through to September in two 12,000- and one 6,000-egg incubators, with another of 24,000-egg capacity being installed this year.

There is no pampering at any stage. Day-olds are drafted into groups of 60-70, in pens which are equipped with electric 'hens' placed on a board littered with 3 inches of dry wood shavings. A thousand birds at this stage are comfortably housed in each of the ex-army huts which were bought at extremely reasonable prices, stripped on site, brought home and re-erected; and the birds are housed in this way to the eight-week stage.

The next stage of rearing is catered for in true improvised style, exploiting compounds and pole barns made with farm timber, wire netting and galvanized roofs. Some of these use the old stone walls around the steading, and will accommodate up to sixty eight-week-olds or eleven mature breeding birds. Such an enclosure costs roughly £12 and lasts ten years. Two bales of straw a week are required to keep it littered. But Mr. Pierce is now also experimenting with galvanized sheds, having wire sides, which have the advantage of being movable. The segregation of stags and hens for fattening is begun at 10-12 weeks of age.

The meat turkey is produced in a range of weights that comes down as low as 5 lb at eight weeks old, for the weekend trade. The extremely efficient conversion rate of the young turkeys, coupled with their fast liveweight gain in early life, make this sort of bird competitive with poultry; they sell at from 4s. 6d. to 5s. 6d. a lb with a particularly brisk demand from Easter to September. Feeding combines the proprietary and the home-produced ration. All birds are fed proprietary starter up to six weeks, when a proportion of home-grown oats is introduced. By fourteen weeks the birds are eating oats and wheat. Six weeks before Xmas they are changed to a fattening ration.

The demand is primarily for birds *under* 14 lb live weight or *over* 20 lb: all are sold alive off the farm.

Not only are meticulous standards applied to the choice of progeny tested stock; the fertility and hatchability are kept high by simple measures of good husbandry. During mating and laying, for example, all saddled hens are numbered, and any hen found on the nest at night receives corrective anti-broodiness treatment for two days. After using extremely simple and rudimentary nests—straw bales with a sheet of galvanized iron across them—Mr. Pierce is moving to the use of a more elaborate nest, to which only one bird at a time would have access. He has also been experimenting with the use of cages for recording purposes.

The flock average production per hen is now running at fifty poults, and exceptional birds have produced up to ninety-four of excellent saleable quality. Demand for the Abbotside birds at present exceeds supply.

It is a measure of the soundness of the management that no routine prophylactics are used. The birds are kept in manageable small batches, very much under the stockman's eye, and if there are any signs of early trouble the infected batch and its neighbours are dosed. All pens, compounds and equipment are rested and sterilized during the two months of each year in which they are empty.

Battery Partridges

P. R. SYMONDS

Director, Cotswold Game Farm, Stroud

Partridge rearing is now common practice, but wintering the birds is still a problem for most people. Battery cages have been used very successfully on the Cotswold Game Farm.

THE sporting press has recently reported a sensational increase in the numbers of partridges shot all over the country—even in places where they have been practically extinct for twenty-five years.

When new areas are suddenly populated, the birds can only have arrived from some more fortunate district or, of course, have been actually hand-reared on the spot. In fact an increasing amount of hand-rearing has been carried out during the last few seasons. We began rearing partridge chicks by hand in 1955, which was a reasonably good year. Then came disillusion. The cold wet summer of 1956 killed off our partridges as fast as we could hatch them. In our minds partridges were no longer a pleasure to rear, but the very devil.

Actually the long wet spell in our second season of modern partridge rearing was a blessing in disguise. We realized the limitations of a system that worked only in a fine summer, and racked our brains to see what could be done about it.

Fortunately we learnt at this time that the Danes were having greater success with partridge rearing than we were in this country. A visit was quickly arranged to the Danish State Game Farms, where we were given every facility to study their methods. The outcome of this visit was that in 1957 we were able to evolve a completely new development in partridge rearing for this country, which has made partridge rearing independent of weather conditions and of the broody bantam.

Electric brooders

In this system, the chicks are placed in electric indoor brooders where they stay for the first three weeks of their lives. Each of these specially-designed brooders takes 25 chicks at a time.

The chicks are fed on nothing except a proprietary partridge food, straight out of the bag, until their last week in the brooder, when a little green food is added in the form of a clover turf. Water is supplied in special founts which prevent the chicks from getting wet.

Perhaps the most startling thing about the system is that at three weeks the chicks are removed to grass, without any hardening off. As long as the outdoor pen has protection from wind and rain all will be well. Except in the warmest weather it is desirable to form the coop portion of the run into a sort of hay-box. This can be done by bending a piece of wire netting into the shape of a tunnel and padding this around, except for the entrance, with hay.

BATTERY PARTRIDGES

With this method it is quite common to rear every chick, but watch must be kept from the age of about 2½ weeks to see that they do not start feather-pecking. At that early age it can be fatal, but it can be checked by de-beaking. This operation is carried out either by an electric de-beaker that cauterizes the beak, or with a pair of nippers. It is only necessary to remove about an eighth of an inch from the top mandible.

At between six and twelve weeks old, the partridges to be freed should be moved in their run alongside a suitable cover crop. Liberate only half the number at first; then those left in the run will by their calling keep the loosened ones around. After two days, liberate the remainder, and by that time the first lot will have settled into their surroundings.

If the partridges are to be kept for breeding stock, they should remain in their run, folded over grass, for as long as possible. They will almost certainly need dividing up into smaller lots. Broods brought up together as a covey have a nasty way of suddenly falling out among themselves, after the age of twelve weeks. Killings will take place unless the numbers in a pen are reduced, and in any case feather-pecking is more prevalent where there is overcrowding.

Common causes of loss in winter

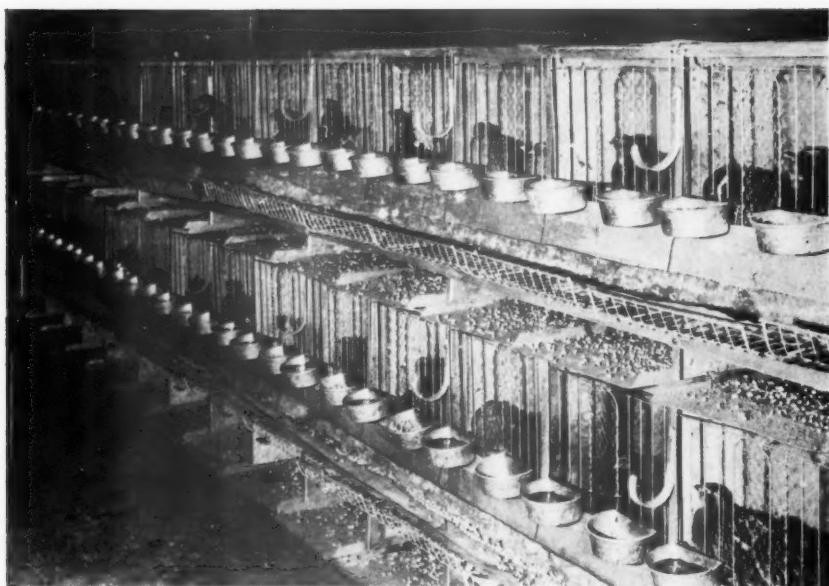
Unfortunately partridges cannot be wintered as easily as pheasants. If they are brailed like pheasants and turned out into large open aviaries, they will be set upon by owls at night and hawks by day. Losses can be heavy. Indeed if they survive the owls, the hawks and the ground vermin, they still have each other to contend with. Even if the precaution is taken to pen the sexes separately and well apart, the birds will fight as soon as the first spring-like day arrives in perhaps January or February. What happens is that one bird starts to chase the other, and as soon as the one who is doing the chasing tires his or her place is taken by another. This goes on until the chased bird drops from exhaustion; it is then killed and even eaten by the others.

Wintering partridges in small numbers in folding pens can also lead to high losses. In this case they are free from owls and hawks, and probably from stoats and weasels, but rats are very fond of partridges and will come some distance for such a tasty meal. Rats usually kill all the birds in the pen attacked, and will continue through all the pens until they can be trapped.

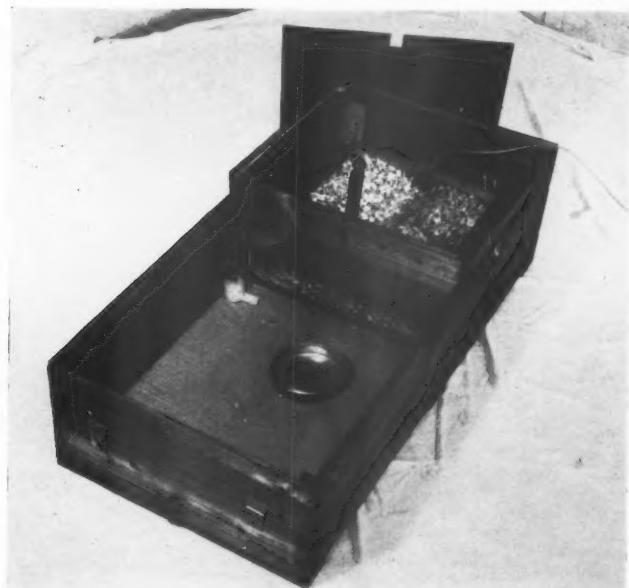
Another danger of the small pen when once winter has arrived is, of course, snow. In one storm the pens can become so full of snow that they cannot be moved for several weeks. The partridges usually manage to keep above the snow, but after a few days sanitary conditions become so bad that disease may well take its toll.

We found this wintering of partridges so costly and disheartening that we were on the point of giving up the struggle. Then came a flash of inspiration, both novel and startling as far as game-bird rearing was concerned: the use of battery cages to winter the birds.

For the first experiment we converted some ordinary indoor poultry battery cages. These proved so successful that we set about designing a special partridge battery that would stand out of doors. With young birds it is best to segregate the sexes, but adult pairs can be left together in a cage to



The prototype partridge battery, designed to stand out of doors against a wall. Each cage will hold up to four birds—two pairs.



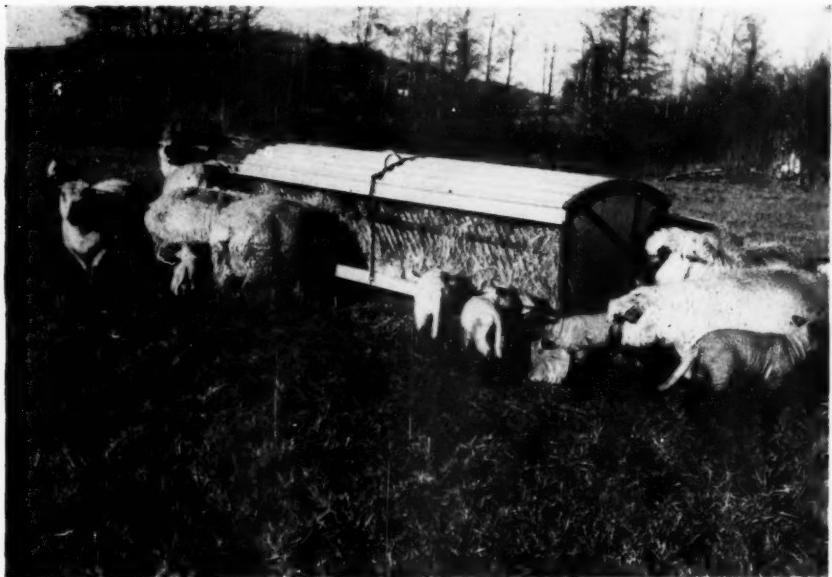
Photos: John Tarlton

An electric indoor brooder, which will house 25 chicks for the first three weeks of their lives.

Early Fat Lamb in Devon (Article on pp. 605-9)



Dorset Horn ewes and lambs folded on a mixture of kale and swedes. Christmas 1960.



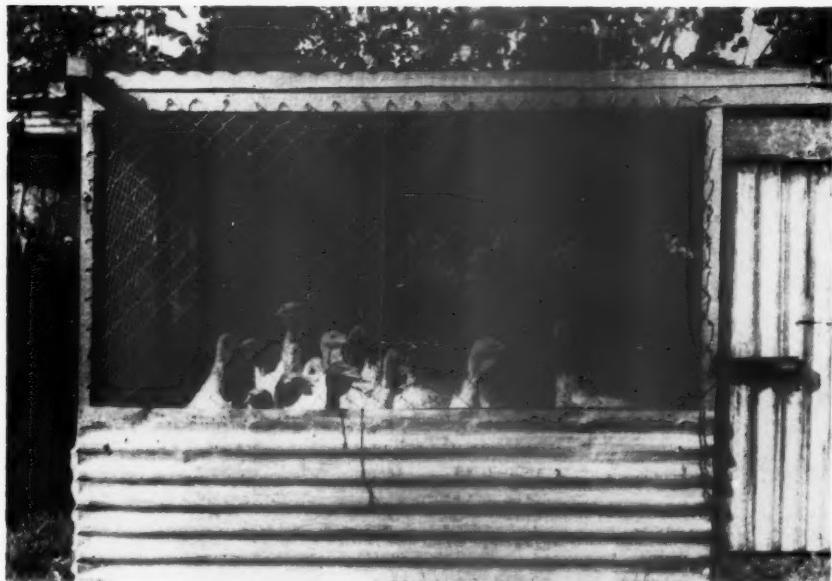
Photos: A. J. Brown

Dorset Horns—the lambs born last December—on grass with supplementary feeding at Bonehayne Farm, Colyton, Devon.

Turkeys from Small Beginnings (Article on pp. 627-8)



The use of cages for laying stock simplifies control and recording, but cracked eggs are a problem.



Photos: John L. Jones

These galvanized iron and wire compounds have the advantage of being movable.

Starling Roosts and their Dispersal (Article on pp. 624-6)



Photo: Major H. A. Sykes

Starlings in such numbers that their sheer weight may damage the trees in which they are going to roost.

BATTERY PARTRIDGES

themselves. This winter we are trying two pairs to a cage. It is important to keep the birds, both young and old, well de-beaked to avoid feather-pecking.

Our partridge battery is made up of six cages, each holding up to four birds. Each cage is fitted with a food and water pan protected from the weather, a wind shield, and a droppings tray for easy cleaning.

It is advisable to stand the batteries with their backs to a wall or building, and we like to enclose them in a wire netting pen of one-inch mesh, to exclude small birds that may carry away much of the partridges' food in hard weather.

We feed our partridges while they are in the batteries on a good quality growers pellet, changing over to breeders food as the laying season approaches. The partridges will benefit from being given a piece of swede to peck at.

As yet we have not tried keeping partridges in these batteries during the actual laying season, as we think a better egg is produced when the birds are folded over grass. In America, however, batteries are used for penning Bobwhite quail during the laying season, and we are going to keep some of our own quail stock in this way next season.

Every shoot, indeed every farm, should have a broody hen or two ready to receive any cut-out partridge eggs. Broody hens still hatch game eggs better than any one type of incubator, but unless the spring is a really good one, it is advisable to rely on a brooder to do the actual rearing. Don't discard partridge eggs because they have become chilled. We have known partridge eggs in all stages of incubation to hatch well, even after exposure to heavy cold rain for longer than twenty-four hours.

FOURTH C.L.A. GAME FAIR

The Country Landowners' Association is to hold its fourth Game Fair at Weston Park, Shifnal, Shropshire, by kind permission of the Earl of Bradford, on Friday and Saturday, July 21-22. The site chosen is most attractive, including an old range of stable buildings adjoining the lovely seventeenth century mansion and a large area of undulating parkland with groups of fine trees.

The main features of previous Game Fairs are to be retained this year. There will be clay pigeon shooting and rifle shooting competitions, gun-dog tests, casting and coarse fishing competitions, archery and falconry displays, trade stands for gunmakers, tacklemakers and game farmers and allied trades, as well as an advisory section on game rearing and management.

The Association hopes that the attendance at Weston Park will at least equal the 20,000 gate at last year's Game Fair at Castle Howard.

Scotland may have a chance to see the Game Fair in 1964 or 1965, as the C.L.A. is offering the Scottish Landowners' Federation an opportunity of putting it on there. If a Game Fair is held in Scotland there will be no English Game Fair that year.

National Power Farming Conference

J. W. HOLLIDAY, M.I.A.E.

Ministry of Agriculture, Fisheries and Food

The tenth National Power Farming Conference was held at Brighton on 7-9th February. Its theme was *Power to Compete*.

In his opening speech at the Power Farming Conference, MR. J. M. A. SMITH of the Ford Motor Co. paid tribute to British exporters of agricultural machines, who in 1960 sold the remarkable total of £130 million worth of machinery abroad. "Europe", said Mr. Smith, "has always been our best market, but with the great changes taking place on the Continent every manufacturer must sharpen his teeth; he must provide his customer there and at home with the machine he needs at a competitive price".

After listening to MR. J. ARBUCKLE of Newburgh, Fife, a member of the Potato Marketing Board, the Conference was left in no doubt of the part potato growers and breeders have to play. He said "developments in the future cultivation of the growing crop must deal with greater elimination of clods and of any clod-forming actions by implements. Another improvement necessary in our present methods must be towards the reduction of greening in the tubers". In pointing to the fact that of the 70,000 potato growers in Britain, 50,000 grow less than 3½ acres each, Mr. Arbuckle stressed the need for central grading stations to handle the output of the small growers. There is no doubt that potatoes must reach the consumer in very much better condition and quality than has been the case in the past. Tomorrow we may have to think in terms of peeling, processing and cooking. "This fits in with the need for pre-packing" he said, which is gaining fast in popularity. "The size of the pack would vary according to the demands of the consumer, but in my view should be not less than 5 lb—preferably it should be 10 or even 25 lb."

The consumers' view was expressed by MISS SUSAN MARSDEN-SMEDLEY who thought that there was a market for three grades, provided a uniform size and quality in each grade was maintained. "It is also very necessary that the exact weight be shown, and the housewife made aware of the variety and cooking characteristics". Two packets of processed potato from America were shown by MR. ROLAND WARD, who warned Conference that they will shortly be on sale here in considerable quantity. He said that we already suffer from the indiscriminate import of potatoes from Europe, and asked: "Are we going to submit to this threatened new invasion of our market or are we going to do something about it?"

Cattle feed

"Food and labour together account for 88 per cent of the total cost of producing milk", said MR. J. S. MORREY, a well-known dairy farmer from Wiltshire. He emphasized the importance of well nourished young grass as the cheapest form of feed available. "This is where the modern forage harvester can really pay off. Crops not required for immediate grazing can be removed and stored as silage without being touched by hand. But it

NATIONAL POWER FARMING CONFERENCE

should not be overlooked that cows are themselves designed as self-propelled forage harvesters. When planning the mechanisation of the dairy farm we must not overlook the possibilities of reducing work by capitalizing the concept of the cow waiting on herself in suitable surroundings. Anything less than thirty cows cannot, under today's conditions, be considered a full man unit".

Maize for Silage was MR. W. E. CAVE's subject. Presenting no special problem for the farmer, maize can be grown, harvested and fed without any hand labour. It is good feed for all classes of stock, and out-yields any other crop capable of complete mechanization. These opinions, said Mr. Cave, were based on his own limited experience in Wiltshire, but he thought the time was ripe for an official body to carry out growing and feeding trials to see if maize was as good under British conditions as it undoubtedly is in the United States.

MR. C. E. P. CHATAWAY of Christopher Hill Limited, outlined the advantages to be gained from bulk feeding of cattle, pigs and poultry. He showed how this could be done with a small labour force enjoying better conditions of work, and said that "the progress which will be made, as in so many other undertakings in agriculture, will have to go hand-in-glove between the farmer and the trade". *Organic Irrigation*, or the distribution of animal manure in liquid form as practised widely on the Continent, was the subject of a paper by MR. T. S. GARBETT of Farrow & Sons. "Organic irrigation", he said, "meets some of the need for water irrigation. It eliminates pollution, and returns to the land valuable manures which are otherwise lost." A cow yields £9 worth of manure and urine annually, so there is a need for a central drainage system in buildings where stock is housed. Having got the "solids not straw" into the drainage pit and properly diluted, Mr. Garbett then outlined the means of agitating, pumping and distributing it to the fields.

Weed control: cultivation v. chemicals

The use of chemicals is often regarded by farmers and the public with aversion, said MR. A. S. ABEL in his talk on *Sprays and Spraying*. This, he suggested, arose from a marked reluctance to get to grips with the technicalities involved, and a failure to appreciate the true part that chemicals have to play in modern agriculture. "The traditional methods of cultivation in many crops have as their main objective the removal of weeds, and if these can be more effectively controlled by the application of herbicides, are cultivations necessary?" He cited as an example the effect of tractor operations in potato cultivation, and the clod formation resulting from it. He outlined some experimental work done by N.I.A.E. Scottish Station, where chemical control was substituted, and said: "I am fully confident that within a very short time we shall see an extension of this development put into practice as newer and more effective herbicides are proved satisfactory for the potato crop". Mr. Abel went on to review the progress made in the control of wild oat which, he said, seriously infested about one million acres of arable land in this country. Five years ago the chances of control appeared well nigh impossible, yet now we have two chemicals shown to be quite effective for this purpose. One requires incorporation in the soil and is limited to a crop of barley. The other is for post emergence use in barley and wheat, and is satisfactory except with one or two varieties.

NATIONAL POWER FARMING CONFERENCE

Too much money spent on mechanization

MR. HOWARD MORGAN, of the Agricultural Mortgage Corporation, eloquently rode rough-shod over many farm balance sheets. He left no doubt that in his opinion if most farms are not over-powered they are wrongly powered. Labour accounts for about a quarter of farming costs today, as it did 25 years ago, whilst the cost of power has multiplied almost three-fold. In dairying the power cost now represents on average 11 per cent, and in catch-crop farming 22 per cent. If the farming income does fall, and there are signs that it will, then farmers must first look at their expenditure on power. A farmer should not "buy a machine", but "mechanize an enterprise". Mr. Morgan strongly advocated the joint ownership of machines through machinery pools or similar co-operative organizations, as a means of reducing the cost of power and so increasing net profit.

MR. J. A. STODDART, M.P., who farms in East Lothian, admitted to knowing little of pigs or poultry but clearly knew much about cropping and beef production. Amongst other advice he gave to the makers of agricultural machines he said "I am not a fervent disciple of the cult which seeks bigger and inevitably more expensive combines. That is why I would rather have two identical combines costing, say, £1,400 each than one of £2,500, provided that the capacity of each of the smaller machines was not less than half that of the big one". He criticized the modern corn drill. His examination of the plant population after its use showed a variation in sowing rate of over 100 per cent. Can anything approaching precision be attained at current speeds, he asked, and if not, would it be worth achieving if one had to be content with sowing one acre an hour instead of over two? He thought it likely that the sowing of grain at a consistent depth and spacing would increase yields substantially.

Mr. Stoddart also compared the harvesting of potatoes by machine and by pickers on piece-work. He appreciated the task facing the machine, but "where the harvester fails in its present line of attack is in the slowness of its performance". He concluded: "A tremendous combined operation has been mounted by engineers, chemists and plant breeders, and their wonderful contrivances have been put to great effect by the farming folk themselves. But no one, I think, would deny to those who have designed and built the machines the right to take as their motto 'First among equals'."

"Agriculture" Index

The Index to Volume 67 will be issued with the April number.

The Market for English Dessert Apples

R. R. W. FOLLEY, B.Sc., B.Com.

Department of Agricultural Economics, Wye College

A record crop of dessert apples last year is turning the growers' attention to what is likely to happen in the future. Mr. Folley discusses some of the issues involved.

APPLE growers seem content to invest thousands of pounds in orchards and stores in the expectation that someone will want to buy their fruit. *Someone* just about sums up the situation for most growers, for what is known about the character and capacity of the British market for fresh fruit? Consumer surveys tell something about people's buying habits, why they want apples, and when they eat them; but when it comes to knowing what volume of fruit of given quality is likely to be demanded at a given price at a given time of year, growers are in a twilight of ignorance. They are not exactly in the dark, because it is clear from past experience that certain sizes and flavours are preferred to others as long as they are available; and growers have responded in no uncertain way by switching from culinary to dessert varieties.

Today growers are asking the public to buy more apples than they have been used to. Having brought supply (in terms of quality and quantity) more into line with demand, growers can now begin to time their sales so as to profit as far as possible from the marriage of supply and demand over the season as a whole. It has already been done (successfully on the whole) with cooking apples. If supply and demand do get out of harmony, who will have erred, growers or consumers?

But how many growers know which is the best month for apple sales? How many would say November? There is room for several opinions, because no one can be sure: but ought not growers to have an inkling of the potentiality of the market at different times of the season? The market firms on whom growers often rely for guidance have rarely felt able to give the grower other than general, short-term recommendations. "Stop sending" is a clear enough message, but statements such as "I could sell three times the amount . . ." may be over-optimistic, because in making them the salesman is perhaps assuming that only *he* would have more than at present. What is far more likely to happen is that, if one salesman has three times the quantity to sell, so will all the rest, and then their tune might alter. The market is far bigger than any one firm, and *market* information is what the grower wants now. It has not as yet been forthcoming.

Demand seems to be seasonal

If you build up the average weekly market prices of the leading varieties of apples into monthly averages, and multiply them by the Ministry of Agriculture's estimate of the volume of marketings, you have a rough measure of the amounts of money spent on English apples each month, which indicates the strength of the demand. Look at Fig. 1 for one such

THE MARKET FOR ENGLISH DESSERT APPLES

computation, based on the results for 1956, 1957 and 1958 crops. The author has purposely avoided mentioning sums of money, and is interested only in

INDEX (AUG = 100)

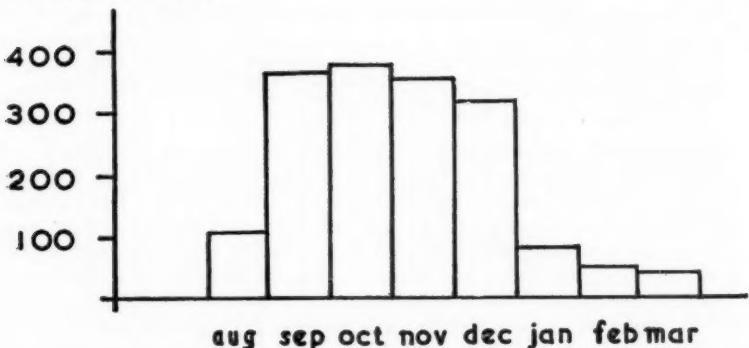


Fig. 1. Index of value of monthly sales of English apples 1956-58.

the relative totals for each month. There is every indication of a strong *seasonal demand**, and the season may be earlier and shorter than many growers would wish.

If consumer demand for English apples were constant between July and March, monthly prices would be different from what they are at present. Actually, the desire for apples seems to vary from one month to the next. On a cursory analysis, demand seems to be stronger in the early autumn, and weaker in the New Year, than growers have allowed for—bearing in mind that they have been handicapped early in the season by having only inferior varieties to offer. The current trickle of early varieties is not a convincing start to the English season and does not provide effective opposition to Italian pears, peaches and grapes. Considering the fruit on offer, the relatively high level of July and August prices suggests that prospects for limited additional sales of improved varieties will be at least as good as those for January. The growers whose most recent plantings have included some George Cave, Scarlet Pimpernel and Early Worcester have taken a justifiable risk.

Fig. 2 sets out the relationships between average monthly prices and the quantities thought to have been sold in the three years 1956-58. The prices are specially-calculated weighted averages, and make allowance for Cox's being more in evidence in the second half of the English season than in the first half—at the past level of supplies, of course, not the future level.

The entries fall obviously into two blocks, with little connection between the two. Prices in September, October, November and December (fortified by Christmas) indicate one demand situation; in January, February and March, another seems to prevail. Demand in August is closer to that of

*Adjustments have been made to allow for the larger quantities of lower-quality apples available in September and October.

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January-February than to September-October, though belonging wholly to neither period.

The monthly average prices for September, October, November and December could conceivably illustrate one demand curve (prices rising as quantities sold are falling). The remaining months' prices could not easily be fitted on to the same curve.*

AVERAGE MONTHLY PRICE (S. PER CWT)

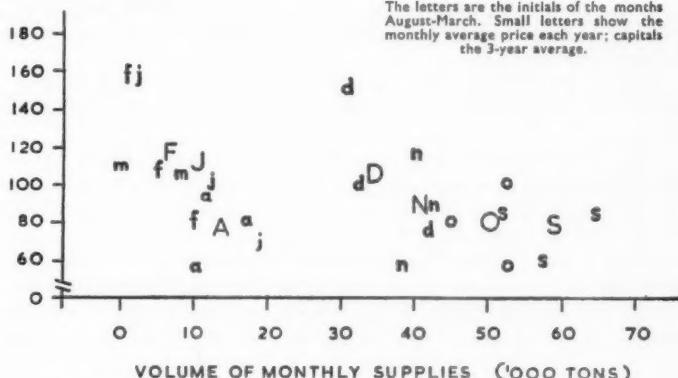


Fig. 2. Weighted average monthly prices of English apples 1956-58.

How many market men would agree with the following interpretation of price movements?

1. That considering the quality of the English dessert apples available in September, the average price has been relatively high.
2. That considering the quality of the English dessert apples available in November and December, and the lower quantities on offer, the average price has been relatively low.
3. That early in the calendar year, although there are good quality English apples on offer, demand is relatively weak.
4. That, for the same quantities, prices would be lower in the period January-March than in December.

Put another way, it seems fair to assume that consumers want rather more fresh apples during July and August than they have been able to buy; that during September and October they have been reasonably satisfied; that during November and December their interest is sustained by Cox's and Laxton's, but that during January and February they will have to be coaxed into eating more.

No doubt the pattern of regulation of imported apples has contributed to the apparent seasonality of demand. Fruit from abroad intrudes on the consumer's thoughts at the opening and towards the close of the English

*The three-year average monthly prices for dessert apples (weighted by variety; average of first and second qualities) have been:

September	75s. a cwt	November	85s. a cwt
October	80s. a cwt	December	109s. a cwt

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season. Australian apples hang on in markets through August, and Italian and North American varieties arrive in quantity under the enlarged quota for the first half of the year. The volume of sales of English apples, however, need not suffer because of direct competition from imported varieties if the English fruit is superior in quality and flavour: but prices will almost certainly be lower as a result of the presence of imported alternatives.

Prospects for January-March

If the above appreciation is correct, it raises more questions. First, what are the prospects for selling more English dessert apples between January and March?

There is no escaping the fact that if apples are not much wanted at this time of the year demand will be relatively *inelastic*, and a big fall in price may be necessary to tempt consumers to buy.

There has been only one year of sizeable carry-over of Cox's and Laxton's after Christmas, and that was 1958. Then, quality was poor, the weather depressing, and prices unnaturally low. On this slender evidence, however, the portents are none too bright.

What is there to justify this opinion? The slope of the line joining the three entries for each month in Fig. 3 gives the clue. The nearer the slope is to the horizontal, the higher prices will be as monthly output increases: the nearer to the vertical, the lower prices will be as output increases. The

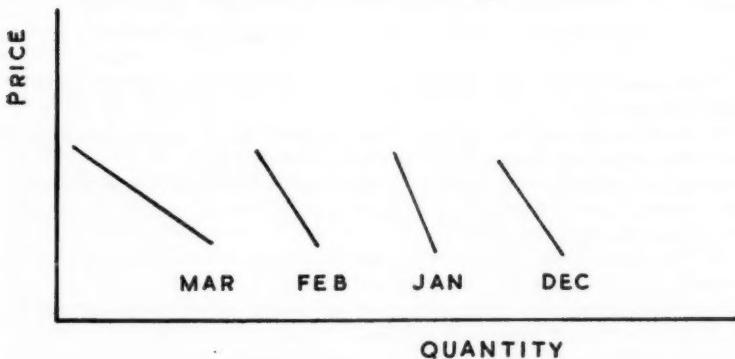


Fig. 3. Average demand for English apples December-March inclusive, 1956-58.

better to make the point, the relevant "curves" from Fig. 2 have been reproduced diagrammatically in Fig. 3. There is an unmistakable indication that the "demand-lines" are tending to become more upright during January and February than in March or December. It might be policy to leave the mass market to the Italians and North Americans in such circumstances, provided enough English apples will keep in store until March.

Now what would be the most economic distribution of supplies over a nine months' marketing season? Most of the bigger growers are about to experience an increase in crop, and will find the additional fruit an embarrassment if they have nowhere to put it. There will be an enormous demand for more

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storage accommodation. A 50 per cent increase over last year's Cox's crop was forecast for 1960. Possibly 110,000 tons of this variety were available for the fresh market. If pre-Christmas sales were on the same level as in 1958, the volume to be sold after Christmas will have been three times larger than in 1959 and twice as large as in 1958.

Ideal distribution of supplies

To manage the supply of Cox's to best effect in such circumstances will call for a compromise between the ideal and the necessary. Fruit put into gas store which is not keeping well, may have to be marketed in January when ideally it should have been held over until early March. If this were to happen on a large scale, the January market would soon be overloaded. January, then, is one potential weak spot. Another is early December, when the natural-stored crop is ending and chamber-stored fruit is beginning to appear in quantity. The profit on short-term storage will then be decided by the premium that the stored product maintains over the non-stored—in other words, by how much the farm price of firm fruit exceeds that of fruit that is beginning to lack firmness and to wrinkle.

How could the industry best dispose regularly of 120,000 tons of Cox's in one season? If one body were responsible for marketing, two policies appear possible: first, to sell during the fresh season all the fruit that can be sold at a profit, and store the rest; and secondly, to withhold from the fresh season the supplies needed to meet consumers' expected requirements of stored apples. The first policy could give consumers a relatively cheap, seasonal supply, with moderate returns and risks to growers; the second is designed to extract from consumers as much money as they are willing to spend on English apples, and to give maximum revenue and profits to growers, though it enlarges their commercial risks. There is, of course, no central controlling marketing authority and growers will make their own decisions. Individual actions seem to be a blend of the two policies, because growers feel that they cannot be sure of their market or that their apples will keep long enough in store.

Experiences this year will sway the argument one way or the other, but on present knowledge it seems as if the ideal distribution of Cox's supplies—for the Cox grower, not necessarily for the man with a considerable acreage of other mid-season varieties—would be rather as follows (monthly figures in thousand tons):

September	10	December	25	March	15
October	20	January	10	April	5
November	25	February	10	TOTAL	120

The novel features of this distribution are greater concentration on the start of the season and greater accent on long-term storage.

Hitherto, 21,000 tons is thought to be the highest delivery of Cox's in any month. Early marketing does not imply the sending-off of immature samples: it means that growers in early districts would not delay marketing until all the fruit from the orchards picked first could be properly graded and packed. To give other varieties a chance, however, growers as a whole are unlikely to hasten their sendings of Cox's in September and October, and will hold another 5-10,000 tons in store until the New Year.

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If the fruit keeps well in store, its price will rise relative to its cost. But three months' storage costs little more than one month's if there is no other use for the stores. In such a context the cold store becomes simply an expensive depository or convenience for holding fruit until such time as the grading staff can handle it.

Allowing for the 5-10,000 tons of Cox's voluntarily kept off September-October markets, the industry will need up to 100,000 tons' storage capacity for dessert apples in peak years. About 20,000 tons of this will be cold storage capacity. 60,000 tons gas storage for Cox's, and 15,000 tons gas storage for other varieties. Not all of this, however, need be new construction. Some space will be yielded by Bramley's Seedling. Gas stores would not be economic if they were only used occasionally, or if their regular use tended further to deflate prices in the New Year. On the scale of marketing envisaged, January-March prices should at least equal those of the preceding December in a year of normal fruit quality.

THE MINISTRY'S PUBLICATIONS

Since the list published in the February 1961 number of **AGRICULTURE** (p. 598), the following publications have been issued.

MAJOR PUBLICATIONS

Copies are obtainable from Government Bookshops (addresses on p. 660) or through any bookseller at the price quoted.

BULLETINS

No. 172. Planning Farm Work (New) 7s. (by post 7s. 7d.)

Explains in general terms what work study is intended to do, suggests standards that may be used to locate faults in the use of labour and shows how farm layouts and work routines can be improved in practice.

LEAFLETS

Up to six single copies of Advisory Leaflets may be obtained free on application to the Ministry (Publications), Ruskin Avenue, Kew, Richmond, Surrey. Copies beyond this limit must be purchased from Government Bookshops, price 3d. each (by post 5d.).

ADVISORY LEAFLETS

No. 163. Onion Fly (Revised)

No. 205. Apple Powdery Mildew (Revised)

No. 490. The Water Vole (New)

FREE ISSUES

Obtainable only from the Ministry (Publications), Ruskin Avenue, Kew, Richmond, Surrey.

BOOKLET

Agricultural Chemicals Approval Scheme—Approved Products List 1961

Defunct and Disappearing Breeds of Sheep

SYDNEY MOORHOUSE

An account of some of the interesting breeds which we have lost—casualties of the cross-breeders' art.

It would be difficult to think of any country in the world with a greater variety of breeds of sheep than Britain. Indeed, the question is often being raised whether it would not be an economic proposition drastically to reduce the number of our different breeds.

Quite apart from this, however, there is no doubt that such a wide diversity of breeds is a signal triumph for the British flockmaster and shepherd. The most successful flock is the one which does best on its own particular terrain, and as Britain's topography is such that distances of only a few miles bring changed conditions of rock, soil, vegetation, and climate, it has long been the policy of those concerned with sheep farming to breed stock of the kind likely to thrive best in its native conditions. And because of this we have no fewer than thirty-four distinct breed societies affiliated to the National Sheep Breeders' Association, while there also exists a number of more local breeds which are not numerically important enough to make it worth while maintaining a breed society or flock book association.

All this, however, is a development of the last 150 years or so. Until then there were only a few foundation breeds. Today most of these have either disappeared or become rare. Some of the local breeds, too, have recently passed into comparative obscurity.

Antiquity of the Cotswold

The scarcity of early records makes it impossible to say with any certainty just which can be regarded as the foundation strains of our British flocks, but a consensus of opinion would probably result in the virtually defunct Cotswold establishing a fair claim to being among them.

In his *Companion into Gloucestershire*, R. P. Beckinsale told us: "The Cotswolds have even given their name to a breed of sheep that is one of the oldest recorded native breeds in England. The Cotswold sheep of today are probably descended from the flocks which roamed these hills in Neolithic times, and are the type from which all our domestic sheep have sprung, so that they can truly be called 'as old as the hills'." He then went on to quote the poet Michael Drayton, who, 300 years ago, declared in *Polyolbion*:

Cotswold that great king of shepherds . . .
T'whom Sarum's plain gives place, tho' famous for her flocks
Yet hardly doth she tithe our Cotswold's wealthy locks.

The old Cotswold sheep appears to have been a long-wooled breed, showing something of the characteristics of the Leicester or Lincoln today, but with a much heavier top-knot and possessed of livelier action. The wool was fine in texture and there seems little doubt that it made the most important contribution to the woollen prosperity of England during the Middle Ages

DEFUNCT AND DISAPPEARING BREEDS OF SHEEP

and well into Tudor times. As long ago as in the thirteenth century we hear of Flemish merchants visiting the Cotswold hills for wool, and then Edward III placed a ban on the export, an act that resulted in many foreign weavers settling in this country. A century later, it was laid down that the King alone had power to grant permission for wool to leave the country, and in 1437 the King of Portugal asked Henry VI for special licence to obtain sixty sacks of Cotswold wool to make special cloth for Court ceremonial dress. In 1464, another special licence was given for the export to Spain of four rams and twenty ewes of the Cotswold breed. This may well have played a part in the development of the Merino which was to usurp the British breed's place as the prime supplier of the choicest wool.

Today, the beautiful towns and villages of the Cotswold hills are the greatest memorials to the days when wool from the local breed of sheep had no peer in the world, for the Cotswold factors not only made great profits but spent money in enriching the architectural beauties of their home towns. John Fortey and Will Midwinter were responsible for a great deal of restoration work in Northleach church, and Thomas Dutton presented a row of almshouses to the town. William Gravel, regarded by many as "the flower of English wool merchants", did much to enhance the glories of Chipping Camden.

Robert Bakewell's improvements in long-wooled sheep in the eighteenth century, and the importation of Merinos towards the end of the same century, both contributed towards the decline in popularity of the Cotswold, and in 1837, W. Youatt wrote in *Sheep, Their Management* that "very few flocks of pure Cotswolds now exist, and are rapidly diminishing". Local flockmasters began using the Hampshire Down ram on their ewes and so produced the Oxford Down, which was to supplant the Cotswold in its home area. Some breeders, like the Garne of Aldworth, between Cirencester and Burford, have managed to keep the old strain alive, although it is generally believed that there have been infusions of Leicester blood into their flocks. Today, Mr. W. Garne still keeps seventy-five breeding ewes.

The Garne, however, have not only been instrumental in keeping the old strain alive in this country, but in 1832 shipped the first Cotswolds across the Atlantic to the United States, where the breed still exists.

Norfolk Horn

Another ancient breed, of which only a few remain, is the Norfolk Horn, which is generally believed to have a common ancestry with the various members of the Blackface tribe in the Heath sheep and, more remotely, the Argali sheep of Central Asia. Both sexes were horned, the legs and face were either black or mottled—as in the Blackface of today—and the wool was considered inferior only to that of the Merino and Cotswold. In addition they produced excellent carcasses of meat, Youatt referring to the fact that they were "remarkable for the delicacy of the mutton which they produced".

Youatt, indeed, went so far as to prophesy that the Norfolk Horn would "probably be long preserved for the tables of the rich", but shortly after he had penned those lines came the enclosure of the sandy heathlands on which they thrived. In their new environment, these natural foragers were required to forgo their natural ways and confine themselves to the limited areas of the

DEFUNCT AND DISAPPEARING BREEDS OF SHEEP

folds. The change proved too much, and many East Anglian flockmasters turned their attention to the Southdown, so much so that James Caird (in *English Agriculture*, 1852) spoke of "the restless Norfolk sheep having been supplanted by the Southdowns". But this was something of an exaggeration, for in Norfolk the old breed still had many supporters. In the end, compromise was reached in uniting the two to produce the now popular Suffolk.

Blackface breeds

Further north, however, the Heath sheep has survived more closely to its original form in the various Blackface breeds, which together form the greater part of Britain's sheep population today. In his famous *History of Quadrupeds* (1790), Thomas Bewick wrote: "The north-west part of Yorkshire, with all that mountainous tract of country running to Lancashire southward and to Fort William northward, is occupied by a hardy, black-faced, wild-looking tribe, generally called *short sheep*, which differ from our other breeds not only in the darkness of their complexions and horns, but principally in the coarse shaggy wool which they produce".

A century later, however, Professor Wallace (*Farm Livestock of Great Britain*) referred to the fact that these blackfaced sheep had been divided into "at least seven very distinct sections which might rank as breeds". Here, of course, we see something of that already mentioned zeal for producing sheep that would thrive best on some particular terrain, and today six different blackface breeds—Scottish Blackface, Rough Fell, Swaledale, Dalesbred, Lonk, and Derbyshire Gritstone—have their governing bodies represented in the National Sheep Breeders' Association.

Extinct moorland strains

Even so, there have been other breeds in this area which have disappeared or become rarer in the last century. Entirely defunct is the Warton Crag, or Silverdale, which had a comparatively localized habitat on the limestone hills adjoining Morecambe Bay, in Lancashire, between the Rivers Keer and Kent. Youatt had something to say of this old breed. "They are natives of that part of the country and confined to it", he wrote. "It is a horned breed, with white face and legs, disporting on the rocky limestone land. The wool is long and white, and the sheep farrow well." Professor Wallace also noted the Silverdale, referring to its extreme hardiness and going on to say: "From time immemorial it has changed little in its characteristics, which have been acquired from its environment". The last of its race, a ewe, was exhibited at the Westmorland County Show at Kendal in 1899 and was the only entry in the section for Silverdale sheep. It was the property of a Mr. Cowperthwaite, of Burton-in-Kendal, who, I am told by a grandson, kept it as long as he could as the last of an interesting breed.

Another local breed of which I have been unable to trace any survivors is the Penistone, a native of the moors about the upper reaches of the Don. Lyddeker (*The Sheep and its Cousins*, 1912) described it as "confined to a very limited area in which the pasture consists of heath mingled with grass, and, in accordance with such rough diet, they themselves are of a coarse and badly made type. Nevertheless, they are well suited to their native district and it is doubtless for this reason that the breed has been maintained."

DEFUNCT AND DISAPPEARING BREEDS OF SHEEP

Later, the *Standard Cyclopaedia of Modern Agriculture* (1910) described the Penistone thus: "A Heath breed, cf. the Scottish Blackface, though white or light grey in face and legs. Both ewes and rams have strong horns. It is coarse and ungainly with strong bone and large feet; face long with strength of nose and depth of jaw associated with robust constitution. Distinguished from other sheep by length and muscularity of tail. Fleece of medium weight, with some kemp. Widely distributed a hundred years ago".

Further south, in the Peak District of Derbyshire, another white-faced and probably closely related breed, the Woodland (which takes its name from the valley leading from the Derwent reservoirs towards the summit of the Snake Pass), survives in some of the local flocks, despite the fact that it was said to have been "exterminated" during the severe snowstorms of March 1947.

In the north of England, there has long been a tradition—entirely unsubstantiated by any known facts—that the indigenous sheep of the Lakeland hills, the Herdwick, originated from forty of its kind which were aboard one of the galleons of the Spanish Armada. This ill-fated vessel, having escaped the attentions of Drake and his colleagues in the Channel, ran aground at St. Bee's Head, on the Cumberland coast, and the sheep swam ashore.

Scandinavian ancestry probable

Just how the story arose does not seem to be known, but it is one of long standing, for in 1852 William Dickinson, a local historian and winner of a £50 prize for the best essay in a competition sponsored by the Royal Agricultural Society of England, was able to tell us: "Being altogether unlike any Spanish breed of sheep we are acquainted with, there is room for assuming them to have been an offshoot from some of the more northern countries, Sweden, Denmark, etc., where hardiness is an indispensable requisite". Most certainly the name is much older than the time of the Armada (1588), for records of the Cistercian establishment of Furness Abbey contain several references to "Herdwycks", and these were the sheep farms set up on the Lakeland fell sides.

I have heard this Armada story told in connection with both the Black-face and Cheviot breeds, and it is difficult to understand the connection. In the Isle of Man, too, the native Loghtan, of which there are still a few small flocks, has been given a similar origin (in this case the galleon concerned was wrecked off the Manx coast). It may well be, however, that the Loghtan has a similar foundation to the Herdwick, and that its ancestors were to be found among the Scandinavian flocks. This belief is supported by the fact that there is a close affinity between the Loghtan and the native sheep of Soay (St. Kilda), the Shetlands, and the Faeroes, all of which, like the Isle of Man and the Lake District, were subjected to an early Norse colonization.

One of the earliest references to the Manx Loghtan, which stands well off the ground, has a whole brown colour and is of the four-horned type, was that of Sacheverell, who visited the island in 1702 and wrote: "They have a remarkable sort they call Laughtown-sheep; and the wool they call Laughtown-wool, which, when carefully dressed, makes a Cloath near a hair colour, which is one of the greatest natural rarities of the Country".

Several writers have, in the past, referred to the similarity between the Loghtan and those in other parts of Western Europe colonized by the Norse,

DEFUNCT AND DISAPPEARING BREEDS OF SHEEP

among them Thomas Quayle, who wrote *The Agriculture of the Isle of Man* in 1812. Quayle tells us: "A cargo of Iceland sheep, which a gentleman (John Wade, Esq., of Port-y-Shee; to whose kindness the Reporter is indebted for the principal part of his information regarding Manks Sheep) resident in the Isle of Man had an opportunity of examining, resembled the Manks precisely, and in every point; having amongst them a laughten individual. In St. Kilda there appear to be sheep of that colour". "Laughten" or "Loghtan" is, indeed, an old Manx word for brown.

Today cross breeding plays an all-important part in British sheep breeding, and the half-bred population is extensive. This, of course, is but a continuation of that process of evolving more specialized types, in which we have lost a number of the old original breeds and gained many more.

STARCH FROM SURPLUS POTATOES

Canadian farmers have tackled the problem of surplus potatoes with a vigorous self-help programme, according to a recent report in *The Maritime Farmer*, the official organ of The Farmers' and Dairymen's Associations of New Brunswick.

Perturbed by the loss of income through having to dump as waste a substantial surplus of potatoes in 1951, farmers in the Grand Falls area decided to co-operate to prevent a recurrence.

The following year the farmers formed a co-operative venture and built a starch factory, with the assistance of the Provincial Department of Agriculture, which guaranteed up to 45 per cent of the bonds issued. This guarantee was increased later on when the co-operators, upwards of 300, demonstrated their faith in themselves by investing additional capital to increase the throughput and diversity of their factory's production. Today, the capital investment in the plant is valued at about 750,000 dollars.

By 1953 the factory was making raw starch, used in both the paper industry and in food manufacture. Four years later a new section was added to make another kind of starch, the factory being the only one in Canada able to produce this particular product. The equipment is the first continuous process plant of its type on the American continent; the potatoes leave the bin before washing and appear as dry starch in the bag in only half an hour.

Further developments have included equipment to make use of the pomace or waste material left after the starch is extracted. The pomace is passed through presses to take out excess water, and then the final drying takes place in a machine specially imported from West Germany; this produces a dry potato pulp which has proved very satisfactory both for cattle and pigs.

A report of feeding trials at the University of Maine showed that "dried potato pulp balanced with linseed oil meal and hay was the least expensive ration tested per pound of gain, and this ration produced beef with the highest dressing percentage", according to *The Maritime Farmer*, which also refers to the use of dried potato pulp as a valuable additive to silage.

The co-operators must be full of confidence in the future of their venture as they have sought and obtained more pulp from starch factories in Maine. The Canadians are also looking to the future by trying to develop an industrial potato with a high starch content, and variety trials are accordingly in progress.

Farming Cameo: Series 2

35. West Montgomery

W. IORWERTH EDWARDS

District Advisory Officer

WEST MONTGOMERYSHIRE adjoins Radnorshire in the south, Cardiganshire in the south west, and Merionethshire in the north west. The land rises from a few feet above sea level in the Dovey estuary to over 2,400 feet on the Plynlimon range. The northern part of the district is centred on Machynlleth, and the southern half on Llanidloes, the hub of Wales. The main river valleys are those of the Wye and Severn, which both rise in the mountains of the south-westerly part of the district, and of the Dovey in the north.

Except for a brief period of industrial prosperity during the latter half of the nineteenth century, West Montgomeryshire has been dependent upon agriculture. It extends to some 175,000 acres, of which about 60,000 are termed crops and grass, 95,000 are steep hillside grazings and moorland, and some 20,000 are devoted to afforestation.

The soils of the district are derived from non-calcareous Silurian shales and grits and are all deficient in phosphate. In the valley bottoms and on the lower slopes there are alluvial deposits, silty loams and Brown Earths. On the uplands, where the rainfall averages between 80 and 100 inches per annum, podzols or peats are mainly found.

The farms usually have a limited area of in-bye or enclosed fields and a much larger acreage of hill grazings. Of the 1,050 holdings in the district, 370 are less than 20 acres, 520 between 20 and 100 acres, and only 160 farms exceed 100 acres of crops and grass. Most of the farmsteads and cottages are built of local stone, but there are several fine examples of black and white half-timbered houses, and of pitched or cobbled living room floors.

Dairying is restricted to some 13 per cent of the holdings, mainly on the smaller farms in the valley bottoms, Friesian cattle being most common. The main agricultural enterprise is livestock rearing; there are some 20,000 cattle and 280,000 sheep in the district. The hardy Welsh Mountain ewe is able to withstand the unfavourable conditions prevailing in the high rainfall areas in the west and north of the district. A slightly larger speckled Welsh type thrives on the lower hills to the south, and the Kerry Half-bred predominates on the kindlier hills surrounding Llanidloes.

The main source of income from sheep is the draft ewe. The district holds a proud reputation for the quality of its sheep, and upwards of 35,000 draft ewes are exported each autumn to England and to other parts of Wales. Most are sold for crossing with Down rams for fat lamb production, but many of the white-faced Welsh are mated with Border Leicester rams to produce the popular Welsh Half-bred ewe. In the past the wether lambs were sold as stores, but now the majority are fattened on the pioneer crops which are grown to help reclaim the rough grazings. Such crops are followed by productive leys based on S.23 ryegrass and wild white clover.

FARMING CAMEO SERIES 2: 35. WEST MONTGOMERY

Overwintering the ewe lambs has for generations been the main problem of the hill farmer; the whole future of the breeding flock is dependent upon their successful development during their first winter. The traditional wintering on farms on the mild west coast has become both expensive and difficult to obtain, and flockmasters are examining such methods of home wintering as folding on cruciferous crops, grass foggage, and the use of slatted floor sheds.

The cattle enterprise is based on Welsh Black and Hereford cross breeding cows, which are mated to well-bred Hereford bulls. Most of the single-suckled calves are sold in the autumn-weaned calf sales, whilst the multiple-suckled calves which represent the majority, are carried on to 16-20 months of age and then sold as forward stores. Local "bull committees" were established in the south of the district at the end of the last century, and subsequently succeeded by premium bull societies, whose influence is very apparent in the high quality of the Hereford store cattle presented for sale at the local monthly fairs. Most cattle presented for sale are now dehorned.

Pigs are of only minor importance, but poultry play quite a large role in the economics of both the small and larger farms.

Some 290 farmers have taken advantage of the Hill Farming and Livestock Rearing Schemes during the past fourteen years. Many new farmhouses have been built, while others have been modernized, and farm buildings, roads, and sheep-handling facilities have been greatly improved. Many hundreds of miles of new fences have been erected and thousands of acres of rough grazings reclaimed. These improvements have enabled the hill farms to carry greatly increased numbers of better quality cattle and sheep. The smaller units have benefited by the Marginal Production and Small Farmer Schemes.

Successful pioneer work on the reclamation of peaty moorland has been done on the south-eastern slopes of Plynlimon, where, incidentally, the first aerial application of lime and fertilizers took place in 1950. Outstanding establishments of wild white clover and pasture grasses have been obtained without resorting to the plough. The method practised here is to apply lime freely to the unimproved sward, which is then grazed with hill cattle, whose treading, dunging and urinating contribute to the breaking down of the surface mat; then after 18 to 24 months phosphate and seed cleanings are applied and a substantial improvement to the sward is obtained relatively cheaply and easily. There is no subsequent growth of rushes, which almost invariably appear if the land has been ploughed and cultivated.

The high rainfall necessitates a great deal of drainage work and improved mechanization in recent years has speeded up development. Over 1,000 miles of hill grippings, for instance, have been completed.

Welsh is the first language of the cheerful, energetic and hospitable people of the area. However, rural depopulation is a serious social problem, to which isolation, the lack of modern amenities, and the uneconomic size of many of the holdings have each contributed. The decline in available manpower is being largely offset by increasing mechanization, but through economic and social forces many of the smaller, remote units are being abandoned and their land taken over by adjoining holdings.

West Montgomery is an area full of challenge to all who are concerned with farming on its heights or in its valleys. The pioneers, however, are many and their continuing success is a reflection of their tenacity and ability.

At the Farmers' Club

Hypomagnesaemia and Other Metabolic Disorders of Grazing Animals

DEFINING a metabolic disorder as one in which certain biochemical processes within the economy of the animal are disturbed, Mr. S. L. Hignett, B.Sc., M.R.C.V.S., who is in charge of the Wellcome Veterinary Research Station at Frant in Sussex, spoke at the Farmers' Club on 8th February about hypomagnesaemia, ketosis, bloat, muscular dystrophy, hypocuprosis and cobalt deficiency—all of which are metabolic disorders.

In hypomagnesaemia, the level of magnesium in the blood is abnormally low. Grass tetany or "staggers" may follow, though cattle and maybe sheep can have low blood magnesium levels without showing clinical symptoms. Grass tetany, originally called Hereford disease, is now known to occur throughout the British Isles and is widespread overseas. In Britain up to 10 per cent of dairy herds experience it, 1–5 cases per 1,000 cows occurring each year. Thirty per cent of affected cows die. In Scotland, incidence in dairy cows is slightly lower, but 5–7 per cent of the calves in beef herds in the North of Scotland experience tetany, though the death rate is low. Affected ewes die very rapidly. The research effort devoted to hypomagnesaemia is proportionately very much greater than that given to some other more important, but less spectacular, animal disease problems. "Nevertheless", added Mr. Hignett, "this research effort is already paying handsome dividends . . . Already we have vastly improved methods of preventing losses."

In the calf, bone magnesium may augment supplies when dietary levels are low, but in older cattle mobilization of bone magnesium is very limited. Since it cannot build up reserves, the cow is almost wholly dependent on the day-to-day supply of magnesium in her diet. Loss of appetite, or a magnesium-deficient ration, rapidly provokes a fall in blood magnesium concentration, especially if the high water-content of the diet prevents the animal from consuming enough dry matter to meet its requirements—for example when grazing lush pastures in spring and autumn. Two ounces of calcined magnesite provided daily for each cow, or 1½ ounces for each ewe, during danger periods effectively prevent the disease.

Recent surveys indicate that the Ayrshire is five times more susceptible to hypomagnesaemia than other dairy breeds. Considerable genetic differences may occur in the magnesium metabolism of individual animals, possibly related to the rate and extent to which the ability to mobilize bone magnesium is lost with advancing age. Cows which have had six calves are fourteen times more likely to develop the disease than first-calf heifers.

Environmental factors associated with the disease include a low percentage of clover in the sward, a low percentage of dry matter and a high water-content, or a sudden change in diet or the weather that may cause digestive disturbances and temporary loss of appetite. All these factors tend to limit magnesium intake. The disease is not necessarily confined to swards deficient

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in magnesium. Temperature limits of 40-60°F have been suggested by Dutch research workers, from experimental observations. Fertilizer experiments indicate a link between the metabolic disorder and heavy applications of nitrogen and potash. Dutch workers consider that if the herbage concentrations of K, Ca and Mg, inserted in the formula $K \div (Ca-Mg)$, give a value above 1·5, tetany will occur; a value of 3 forecasts a 20 per cent incidence in the herd. Clearly, these environmental factors are interrelated.

Work at Weybridge has demonstrated that several years' protection against hypomagnesaemia and grass tetany can be achieved by top-dressing pastures with 5 cwt per acre of calcined magnesite or 2½ tons per acre of magnesian limestone. Administration of vitamin D seems ineffective.

Practical preventive measures against milk fever are still lacking, said Mr. Hignett. The Americans advocate a diet poor in calcium and rich in phosphorus for some time prior to calving, but this involves certain practical difficulties and may cause additional disturbances. Massive doses of vitamin D five days before calving are uneconomic except for very valuable animals, and also unreliable if calving is delayed, for the effect is transient.

Ketosis—an abnormally large number of ketone bodies in the blood stream—known as acetonaemia in cows and pregnancy toxæmia or twin lamb disease in ewes, is not specifically connected with grazing. Ketosis is responsible for losses in 18-57 per cent of dairy herds. In sheep, though incidence fluctuates, losses are often considerable. Recent research at Bristol University suggests that ketosis in cattle is due to lack of co-enzyme A. Administration of cysteamine has proved more effective than former remedies but more work is needed before cysteamine therapy becomes routine. Its effectiveness against pregnancy toxæmia is not yet certain.

Bloat, which affects 2-16 per cent of the national dairy herd, with a mortality rate varying from 15 to 50 per cent, occurs more frequently on temporary than on permanent pasture, often—though not always—where clover predominates. Susceptibility to bloat seems highest in Ayrshires and Jerseys, and may be an inherited character. Foam breakers have prevented bloat in New Zealand when sprayed on bloat-producing pastures at 2 ounces per cow per day. This method might well be adopted here.

Muscular dystrophy in housed calves receiving dietary supplements of cod liver oil has been traced to vitamin E deficiency, induced by the destruction of tocopherols—the natural precursors of vitamin E—by unsaturated fatty acids in the oil. Recent research suggests that in certain circumstances, the disorder can be prevented by feeding minute amounts of selenium.

Hypocuprosis—low copper level in the blood—is associated with wasting disease in cattle and swayback in lambs. It is treated or prevented by providing additional copper, as a drench, by injection, or in mineral form. Generally the pasture itself is not deficient in copper, but the animal is prevented from utilizing the element by other factors, notably molybdenum and sulphate.

Cobalt deficiency, which has a debilitating effect on cattle and sheep, occurs in certain areas of Britain. It is preventable by the cobalt bullet, designed to remain for life in the animal's second stomach, slowly releasing cobalt. Where soil pH is high and the pastures are heavily limed, an insoluble coating may form on the bullet, making it ineffective.

Sylvia Laverton

Agricultural Chemicals Approval Scheme

Additions to the 1961 List of Approved Products

THE following products have been approved under the Agricultural Chemicals Approval Scheme since the first list of Approved Products was published on the 1st February 1961.

INSECTICIDES

DDT EMULSIONS AND MISCELLANEOUS LIQUIDS

Chafer's W.I. 25 DDT Insecticide—J. W. Chafer Ltd.

DDT WETTABLE POWDERS

Boots DDT Dispersible Powder (50% DDT)—Boots Pure Drug Co. Ltd.

DIAZINON ATOMISING SOLUTIONS

Diazitol Atomising Concentrate—The Murphy Chemical Co. Ltd.

DIAZINON MISCELLANEOUS LIQUIDS

Diazitol Liquid—The Murphy Chemical Co. Ltd.

ENDRIN SPRAYS

Endrex 20—Shell Chemical Co. Ltd.

FLUOROACETAMIDE SPRAYS

Megatox—W. J. Craven & Co. Ltd.

PHENKAPTON MISCELLANEOUS LIQUIDS

Phenatol Liquid—The Murphy Chemical Co. Ltd.

PHENKAPTON WETTABLE POWDERS

Phenatol Wettable—The Murphy Chemical Co. Ltd.

"SEVIN"

Boots Codling Moth Spray—Boots Pure Drug Co. Ltd.

FUNGICIDES

DODINE

Melprex 65 Dodine Fungicide—Cyanamid of Gt. Britain Ltd.

ORGANO-MERCURY-SULPHUR FOLIAGE SPRAYS

Sulpham Dispersible Powder—F. W. Berk & Co. Ltd.

HERBICIDES

AMINO TRIAZOLE

Weedazol-T-L—A. H. Marks & Co. Ltd.

MCPB-MCPA

Bexone Plus—Plant Protection Ltd.

SIMAZINE

Bladex—Shell Chemical Co. Ltd.

SEED DRESSINGS

GAMMA-BHC-THIRAM DRY SEED DRESSINGS

Berk's Lindane/Thiram Seed Dressing—F. W. Berk & Co. Ltd.

MISCELLANEOUS

ALPHA-NAPHTHYLACETIC ACID*

Endrop—Shell Chemical Co. Ltd.

Shellstone—Shell Chemical Co. Ltd.

*Pre-harvest fruit drop growth regulator.

In Brief

QUALITY IN SILAGE

The importance of quality is more than ever appreciated by farmers today. This appreciation is not only relevant to those products which leave the farm gate, but also to the intermediary products which the farmer needs to maintain his herds. A timely reminder of the importance of quality in silage is provided by two articles in the *N.A.A.S. Quarterly Review*.

In the Winter 1960 issue, Mr. Dennis Morgan reviewed the problems associated with the fermentation of silage and its control. Reviewing 20 papers from both sides of the Atlantic, he stressed that the fermentation quality of silage is likely to assume greater importance as the amount of silage made and fed increases. He discussed the use of various kinds of additives and concluded that, for practical silage-making, none of them was as efficient as the physical agencies of chopping, lacerating or wilting in reducing losses, and securing a better fermentation. Wilting was the best treatment of all, especially if combined with chopping.

In the Spring 1961 issue Mr. Morgan follows up with a contribution entitled "Nutritional Considerations on Self-feeding Silage". This is again a review of a wide range of scientific papers and articles, and the result is an authoritative survey of the problems of acceptability, appetite, and the importance of dry matter content. Mr. Morgan states that "although it is claimed that self-feeding of silage considerably reduces concentrate requirements below the levels of traditional feeding systems, data obtained by himself and by other workers show that in practice, concentrate savings are often not as great as is popularly believed. Low-quality silage appears to be the main reason for the need to feed large amounts of concentrates. Obviously, successful self-feeding depends chiefly upon the feeding value of the silage".

Mr. Morgan's review brings out quite clearly that the quality of the herbage and the expertise of the ensiling technique are matters of the utmost importance in ensuring a satisfactory fermentation. He also discusses in some detail the question of feeding a supplement of hay, and suggests that to stimulate maximum appetite for low cost forages and to obtain good conversion rates, it seems desirable to feed a modicum of hay made by the best methods available together with *ad lib* silage.

It is now commonly accepted that devoting the major effort of conservation to silage is one way to ensure that what hay is made is better made.

J. H. Clift

WORK STUDY AIDS FARMERS

In 1957 the British Productivity Council produced the first film on work study in agriculture. Called *Work Study Aids Farmers*, it was widely used by agricultural organizations, and was awarded the Golden Ear of Grain offered for "the most valuable film from the instructional and production points of view" at the International Agricultural Film Festival held at Berlin in 1959.

It shows in graphic, practical manner how work study can help the farmer by drawing his attention to wasteful and unnecessary effort and suggesting improved methods of work. It illustrates its general story with detailed case studies of the application of work study on commercial farms and the benefits it secured there. One of these studies, which shows the improvements in a pig enterprise that followed a work study analysis, is still both valid and effective. But the other, which concerned work study on a dairy farm, has already been made obsolete by technical change.

Fortunately, it has been possible to replace this study by a new and topical example of a work study investigation into poultry housing. This was undertaken

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by a member of the I.C.I. Central Work Study Department at Howe Farm, on Lord Hambledon's estate near Henley, and shows the part that work study can play in developing improved types of farm building. The two-storey deep litter house which was produced by the co-operation of the farm manager, the poultryman and the work study specialist is unorthodox in design but has proved highly successful in operation. In particular, the poultryman, who found himself answering most of the questions which followed the premiere of the revised film on 3rd February, made it clear that he was more than satisfied with the new building and its equipment. He added that the reduction in the time he spent on the routine work of the house allowed him more for the better care and observation of his flock. The point is significant. Work study is not just a means of saving labour. It is a means of making labour more effective, in this case by making possible a higher standard of stockmanship.

Copies of this 16 mm film can be hired from the Central Film Library, Government Building, Bromyard Avenue, Acton, London W.3, the Scottish Central Film Library, 16-17 Woodside Terrace, Charing Cross, Glasgow C.3, or the Central Film Library of Wales, 42 Park Street, Cardiff. They can be bought either from the British Productivity Council, 21 Tothill Street, London S.W.1 or through the Central Film Library. The film runs for thirty-three minutes.

Work Study Aids Farmers will be more effective if it is introduced by someone familiar with the subject and followed by a discussion. A pamphlet called *Discussion Notes*, which provides material to help both the introductory speaker and the leader of the discussion, is issued free with every copy of the film.

Nigel Harvey

WATER VOLES

Water voles, or water rats, are responsible for a good deal of damage in certain parts of the country; not least they are a plague to farmers and drainage authorities, because of their burrowing into, and therefore weakening, the banks of rivers, ditches and lakes. If you suffer with vole trouble write to the Ministry's Publications Office at Ruskin Avenue, Kew, Richmond, Surrey, for a free copy of the new Advisory Leaflet No. 490.

Choice of control lies between trapping, gassing and poisoning. A suitable water-vole trap is described and illustrated.

BROILER MEAT QUALITY

Two interesting contributions on the causes of toughness in broilers are contributed to the second issue of *British Poultry Science* by D. H. Shrimpton of the Low Temperature Research Station, Cambridge and W. S. Miller, of Walton Oaks Experimental Station, Tadworth, Surrey. A taste panel found that none of the broilers, which were produced and processed commercially, were tough by comparison with standard birds of the older, conventional table type. But some practices led to differentiation within the broilers. Sub-scalding for $\frac{1}{2}$ minute at 140°F (60.5°C) gave a less acceptable flesh than slack scalding for 2 minutes at 123°F (50.5°C) before mechanical wet plucking: this is thought to be due to delay in the development of *rigor mortis* because of the higher temperature, as evidenced by the maximum concentration of L-lactic acid in the muscle.

It is pointed out that most of the eviscerated broilers in Britain are deep frozen before they leave the processing plant, whereas in America it is common practice to send them out "fresh" in chip ice or in refrigerated containers. The period of cooling in slush ice before deep freezing was also important, and the optimum period seemed to be around 2-4 hours rather than longer. Birds that were starved for twenty-four hours before killing generally gave a less acceptable flesh than those fed right up to the time of crating.

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When birds of the broiler type, of White Rock strain, were compared with Brown Leghorns and both were reared to broiler weight (3-4 lb live weight), the former gave the more acceptable flesh. The White Rocks matured 3-4 weeks earlier and grew more uniformly. This difference could not be correlated with differences in collagen content of the muscle and is regarded as due to the pattern of growth. When feeding was restricted to 6 hours a day from the 10th day, maturity was delayed by 13-14 weeks, and a much higher food intake would have rendered this uneconomic. Tenderness also seemed to go with the more rapid growth of full feeding. Work of this nature comes at an opportune moment when it is important to establish the quality of the large and growing volume of broiler meat coming on the market.

W. M. Allcroft

ELECTRONIC MANURING ADVICE

Netherlands Newsletter, issued monthly in English by the Dutch Ministry of Agriculture, recently contained an article with the headline "Electronic Manuring Advice". But it does not describe any revolutionary instrument for imparting extra energy to the electrons in the soil particles, as a means of increasing crop yields!

Instead, there is a down-to-earth account of the use of an electronic computer to handle the results of more than two million analyses carried out on nearly a quarter of a million soil samples received annually by the Netherlands Laboratory for Soil and Crop Analysis. This Laboratory was established by the Dutch agricultural organizations and is managed by their representatives.

Until 1960, interpretation of the analytical results was undertaken by the Government Agricultural Advisory Service. Now the computer has taken over the task, using the same basic of comparisons made over the course of many years between laboratory results and experience with field trials and farm practice.

The interpretation of the analyses is not the same for all soils, and advice must always take regional deviations into account. The electronic computer can store all the necessary information which forms the "National Advice Basis for Soil Research", together with all the regional deviations, determined in consultation with the Government Advisory Service.

Information comprising the laboratory analyses and data supplied by the person taking the sample (regarding soil location and classification, depth of sampling, cropping history) are fed into the computer, which builds up the advisory recommendations into the following format:

1. Phosphate and potash status, and suggested dressings for three systems of grassland management or for five groups of arable crops.
2. Lime and magnesium status, and recommended dressings; magnesium dressings are stated only for arable land or sandy soil.
3. Where specially required, an estimation of the trace elements, copper, cobalt, manganese and boron.

The computer takes only twenty-eight seconds to work out one sample, including printing the recommendations. These are then sent direct to the farmer, who can scrutinize them with the aid of a document handed to him by the sampler at the time of sampling. This contains detailed information to guide him in the use of the recommendations, and also includes tables to help him to convert the information he has been given into actual fertilizer.

The Government Advisory Service reserves a copy of each "advice" so that the farmer can get in touch with his local adviser if he needs further help. A saving of about fourteen days has so far been achieved under this new system, often a point of great practical importance. The computer has so far only been used for agricultural manuring advisory work; as the Dutch say, "horticulture will follow in the course of the next few years".

J. H. Clift

IN BRIEF

HUNDREDTH MACHINERY SYNDICATE FORMED

The hundredth machinery syndicate in England has been formed—in Cambridgeshire. The machine is a triple-unit sprout-planter, a relatively inexpensive item of equipment, although the members of the syndicate would not, as individuals, have sufficient acreage to make full economic use of it. They are also interested in sharing other machines, and will probably extend their operations when they have experience of working the scheme. The formation of this syndicate marks a 50 per cent increase on the number in operation a year ago.

Twenty-two N.F.U. County Branches have now set up Syndicate Credit Companies, which are responsible for spreading the idea of such co-operation in their own counties. At a meeting held in December of representatives from all these companies, it was generally felt that during the next twelve months more syndicates would come into operation. There may also be more syndicates like the two now operating in Hampshire and Herefordshire, which carry out specialist ditching, cleaning and drainage schemes. Until now it has been mainly those farmers with medium-sized and large farms who have taken advantage of the facilities available: but recently smaller farmers have shown a growing interest.

A syndicate in East Yorkshire has just completed its first drying season most successfully. In Hampshire, where the scheme was born, there are now forty syndicates, including two grain-drying and storage plants. The running costs of one of these, excluding depreciation, were only 18s. 5d. a ton this year, in spite of the wet summer; in the previous two seasons costs were 13s. 7d. and 11s. 6d. On an average, it is estimated that a member wishing to have 50 tons dried in a season, joining a syndicate capable of handling 1,000 tons, would pay £750 in capital, plus interest charges.

Mr. Leslie Aylward, the pioneer of the machinery syndicate scheme, said recently: "In my view the farmer cannot afford to tie up large amounts of capital in specialist equipment; at the same time he must have the use of it to be efficient. The answer lies in machinery syndicates. I have the use, in the syndicates which I belong to, of £10,826 worth of machinery and £28,500 worth of grain-drying and storage equipment. Sharing machines is pure commonsense. It also helps us to be good neighbours."

ELECTRICITY AT YOUR SERVICE

The latest broadsheet produced by the Electrical Development Association deals with *Farm Wiring*. It is the twelfth agricultural broadsheet to be published by EDA—their object being to give brief but basic information on subjects covered more fully by the Association's technical books. Like the others, *Farm Wiring* deals briefly with the need, how electricity can help, the type of equipment available, installation, etc. It can be obtained from Electricity Board Service Centres and Showrooms or direct from EDA, 2 Savoy Hill, W.C.2.

A 16-page booklet, *Electricity Information Service*, which comprises a catalogue of EDA publications, films, filmstrips and models of interest in agriculture and horticulture is also available from the same address free of charge.

N.A.S. SOUTH-WESTERN REGION

Mr. Colin Ross, O.B.E., who has been Regional Director of the N.A.S. South-Western Region since 1st October, 1946, retired from the public service on 9th March. The new Director is Mr. E. Ll. Harry, O.B.E., M.Sc., formerly Controller of the Ministry's East Midland Region.

ORDNANCE SURVEY

Brigadier A. H. Dowson, C.B.E., A.D.C., has been appointed Director-General of the Ordnance Survey, with the rank of major-general, in succession to Major-General L. F. de Vic. Carey, C.B., C.B.E., who is retiring on 30th June.

Book Reviews

Sheep Management and Diseases. (6th Edition.) H. G. BELSCHNER. Angus and Robertson. 90s.

This latest edition, recently produced, of a now well-known book contains much revised and additional information particularly regarding wool and dipping, breeding and parasites.

The author has succeeded to a remarkable degree in combining in a single volume a fund of practical knowledge on the anatomy, physiology, feeding, management and diseases of sheep. Some points, perhaps, have been dealt with in too much detail for the lay reader; this is true of the chapters dealing with physiology, anatomy and disease in particular. These will be of value mainly to undergraduate, graduate and post-graduate students of agriculture and veterinary medicine.

Mr. Belschner has written from Australian experience and principally for Australian readers so, to a reader in this country, undue emphasis may appear to have been given to certain subjects, and some surprise may be expressed at the complete omission of others. This does not detract seriously from the value of the book for British readers, however.

Among the important omissions there is no chapter dealing with the management of hill sheep, no reference to such diseases as foot and mouth disease, louping ill, tick-borne fever, enzootic abortion; and not enough detail about others such as hypomagnesaemia.

Differences of opinion might also arise over minor points connected with some of the specific diseases with which the author does deal; for example, the occurrence of even acute lamb dysentery without ulcer formation must be regarded as extremely rare in the U.K.

Reference to hypocalcaemia as being most frequent in in-lamb ewes appears a little incongruous when in the United Kingdom it occurs far more frequently after lambing, and is called lambing sickness or milk fever—never grass tetany or grass staggers. These terms are reserved over here for hypomagnesaemia, which appears not to be recognized as an entity in Australia. Much of the description of the clinical symptoms and predisposing cause given in

connection with the former seem to fit the latter condition equally well. But there are no grounds for believing, as claimed, that the addition of ground limestone to the diet will prevent hypocalcaemia as met with in this country. One is also a little surprised that the fasting of sheep prior to dosing with carbon tetrachloride is not recommended, for it is regarded here as a most important measure to reduce the toxic effects of the drug. The use of the recently introduced molluscicide copper pentachlorophenate in liver fluke control is not recommended in the United Kingdom, owing to its toxic properties and the resulting potential risk to operators using it.

The book is nevertheless one which should be in the possession of all either directly or indirectly concerned with the health and productivity of sheep.

W.T.R.

An Introduction to the Biology of Micro-organisms. LILIAN E. HAWKER, A. H. LINTON, B. F. FOLKES and M. J. CARLILE. Edward Arnold. 35s.

The aim of the authors of this book is to give, not a complete textbook of microbiology, and not an exhaustive account of any one branch of it, but a general introduction to the structure, physiology and ecology of the main groups of micro-organisms. It can be said at once that this has been achieved, in prose that is clear, and refreshing to read. The book is correspondingly enlightening and it emphasizes the essential unity of the various branches of microbiology and their social and industrial importance.

It is impossible, in a short review, to indicate the whole range of information given but some idea of its scope can be obtained from a brief summary of the book's contents. The Introduction outlines the various types of micro-organisms and their special characteristics. One section deals chiefly with the structure and life histories of bacteria, fungi, protozoa, slime-moulds, algae and viruses, with shorter sections on the Spirochaetes and Rickettsias. Another

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discusses the chemistry, metabolism, nutrition, growth, reproduction, survival, senescence and death of these organisms; together with their ecology. Two chapters are devoted to micro-organisms of the soil, water and air; two to associations, harmless and pathogenic, between micro-organisms and plants and animals; and two to the microbiology of food, textiles and wood and to industrial fermentations. A useful appendix describes techniques used by microbiologists.

The fifty photographic plates show the micro-organisms as they are revealed by the microscope and the electron microscope, the forms they assume in cultures and some of the diseases they cause; and they bring together into one volume much visible evidence of the lives and activities of these organisms which would otherwise have to be sought in research papers or elsewhere. These plates are all very well reproduced and are supplemented by forty-eight well-drawn line figures. At the end of each chapter is a list of books and research papers which will guide the reader to further literature and information.

The book is well printed, on glossy paper throughout. Although some readers may find the type rather small, this has no doubt helped to produce a book packed full of information yet still of a handy size; but the main reason for this achievement is not the printer's art, but the authors' handling of their material.

G.L.

History of Seed Crushing in Great Britain. HAROLD W. BRACE. Land Books. 30s.

Mr. Brace has a reputation as an historian and antiquarian, and when he combines these talents with many years of experience in seed crushing to write a history of the industry, we expect a work which is not only authoritative but highly readable. He has not disappointed us and gives an interesting account of the growth of a little-known but important industry.

Seed crushing is one of the world's oldest industries, its origins being traceable to ancient civilizations, but references to its application in this country before 1700 are difficult to find. During his research, however, Mr. Brace has unearthed records dating from 1377. Until about 1700 the industry was based on home-grown oilseeds, and mills were found in the Fenlands and

other marshy districts where these seeds grew. During the eighteenth century oilseeds were imported from overseas, seed crushing gradually extended, and mills were erected in other parts of the country, particularly near ports. Mr. Brace traces this extension and also describes the development of the machinery which was necessary to improve production techniques and meet the ever-increasing demands for vegetable oils.

This is a straightforward but somewhat limited story of the growth of the seed crushing industry. It lacks the broad view, especially when it makes no attempt to explain this growth. In particular, no reference is made to the soap and margarine industries, the expansion of which had such a tremendous influence on the development of oilseed crushing.

The story is brought up to date with an account of the solvent extraction and expelling techniques used in modern oil mills; some day, perhaps, a sequel will be written showing how the industry has contracted as oilseeds are increasingly processed in their countries of origin, and only the products in the form of oil and cake imported into Great Britain.

K.S.S.

Weed Control Handbook. (2nd Edition.) Edited by E. K. WOODFORD. Blackwell Scientific Publications Ltd. 17s. 6d.

The rapid developments in weed control, especially in the use of new chemicals, have necessitated a new edition of this handbook, which has already proved to be of the greatest value. As Dr. H. G. Sanders, President of the Weed Control Council, points out in the preface, it uniquely provides authoritative recommendations agreed by the principal commercial and official organizations dealing with weed control in this country.

All aspects of chemical weed control are admirably covered. The classes of herbicides are described, and the common names and properties of some seventy established or potentially valuable materials are listed. A tabular guide to the chief uses of herbicides in cereal and other arable crops and in grassland, vegetable, fruit and flower crops is followed by detailed recommendations for each crop. Other sections are devoted to the control of

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weeds in forest nurseries, lawns, and sports turf, and in uncropped land including roadside verges, and to chemical desiccants used to facilitate harvesting. The relative susceptibilities of weeds, the application of the herbicides, spray drift, the decontamination of spraying machines and the compatibilities of the herbicides with other spray materials receive full consideration. The handbook does a great service in bringing together descriptions of the measures adopted for the protection of the user and the public, and for the approval of proprietary weed-killers, of the law concerning injurious weed seeds and noxious weeds, and of the requirements of the crop seed certification schemes. It is attractively produced and in every way reflects great credit on its authors and the Weed Control Council. More and more it will prove indispensable to all concerned with weed control problems.

J.T.M.

The Economic Background to Agricultural Policy. EDITH H. WHETHAM. Cambridge University Press. 22s. 6d. (Paper bound 13s. 6d.)

Miss Whetham's subject has not attracted as much serious attention from university economists in this country as its importance justifies. On the other side of the Atlantic, American economists have devoted considerable attention to this field and provided students of agricultural affairs with valuable guidance.

During recent years the author of this book has produced a series of booklets in which the facts of agricultural policy have been systematically set out; these have been useful for the historical record. But in this new work she has gone beyond the bare record to examine agricultural policies from the economist's point of view. Starting with a discussion of the varying objectives of agricultural policy, the author goes on to distinguish the relevant economic basic principles, drawing upon many aspects of current economic thought.

In pursuing this course, she brings out the interactions between agriculture and the rest of the economy, and by the end of the book the reader has been brought face to face with many of the dilemmas which confront political leaders and those who advise them on the formulation of agricultural policy.

Depth is added to the book by the generalized approach; this work is not restricted to the United Kingdom and the complexities of its agricultural policy. The author has distinguished agricultural systems at various stages of economic development or, in other words, at various levels of importance in national economies.

While the nature of many of the problems to which she refers will be familiar to those immediately concerned in agricultural affairs, the wider circle of people affected by policy decisions does not generally understand them so well. By reason of its treatment of the various elements within these problems, this book deserves to have the widest readership among those concerned and interested in the agricultural industry, and will surely become essential reading for all students of agriculture.

In her summing up, Miss Whetham refers to the complexity of the forces shaping the fortunes of agriculture and the difficulties of completely understanding or controlling these forces. She goes on to say: "Yet incomplete knowledge, imperfect analysis and inadequate administration will none of them absolve a Government in the twentieth century from the necessity of having an agricultural policy of some kind or another. And whatever agricultural policy is chosen must be based, firstly, on existing economic structure and, secondly, on the existing trends in development so far as they can be ascertained".

The special quality of this book lies in the concise and lucid description of the economic structures and the changing forces which affect them.

J.A.

Cotswold Lad. SID KNIGHT. Phoenix Press. 15s.

Broadway, lying under the northern escarpment of the Cotswold country, clean, tidy and perhaps a little smug, is one of the best known villages in Britain. And to those who know its long High Street, its stone cottages, and the dark, steep face of Fish Hill, this book will have a particular interest, for it was here that the author was born and this is an account of his early days.

A little repetitive and uneven in places, mainly because much of the material has appeared in the form of articles, this is

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nonetheless a readable and vigorous piece of writing. The author, son of the village postman, faithfully and clearly records all that happened in the village, both pleasant and unpleasant, around the turn of the century.

His childhood was on the whole a happy one, but behind all the interests and the light heart of a schoolboy we see a back-cloth of the grinding poverty and squalor of the times. But these hardships are not allowed to intrude to any great extent, and the reader is carried along happily on a flood-tide of bat fowling, fishing, sheep droving and visits to the races and the annual Fair. Mr. Knight has a remarkable power of description and the reader can almost smell the acrid tang of burning hoof as the horses are shod by the blacksmith from Winchcombe, and feel a sense of numbing cold at the end of a fourteen-hour day delivering meat as the trap speeds homewards.

Little appears to have escaped his notice or his recollection; from details of his father's postal round and the food they ate, to the dress and habits of Broadway visitors like Dr. Axel Munthe. All in all, this is an informative, perhaps even an important, little book, and with its attractive line decorations is certainly one of the best of its kind to appear for a long time.

D.C.B.

A Bibliography of Farm Buildings Research 1945-58; Part IV, Buildings for Cattle. Agricultural Research Council. 4s. 6d.

Buildings for Cattle will be a helpful publication to all those engaged in the industry, farmers, architects, agricultural advisers, and research workers alike, and it is particularly gratifying to know that the A.R.C. intend to publish supplements from time to time.

Frequently one hears of the difficulty of obtaining information on the basic needs or optimum requirements of different kinds of livestock. Here, in a concise and very well documented form extending to only a few pages of reading matter, apart from the abstract of published works, is a booklet from which one can readily choose a publication for further study.

The subject is dealt with comprehensively. Section A contains the environmental needs of cattle of all types; Section B relates these needs to adult dairy cattle. Further sections cover "Housing the Dairy

Herd", and "The Design of Buildings for Milk Production and Handling". "Equipment and Working for Dairy Buildings" is sub-divided conveniently into several parts, while such important subjects as economics, beef cattle, methods of feeding, and buildings for calves, are also dealt with.

If any criticism could be levelled at this bibliography, it is perhaps that some of the "abstracts" relating to published works might be expanded a little. A few of these are rather cryptic. Nevertheless, abstracts number 366, and further description would inevitably lengthen the publication.

An index of authors and of abbreviations completes a thoroughly useful work of reference.

R.E.D.

Economics of Broiler Production. B. J. F. JAMES. (University of Cambridge School of Agriculture. Farm Economics Branch Report No. 53.) 3s. 6d. (post free.)

This is one of the most challenging reports yet published in connection with the poultry industry. The economist author has supplemented his knowledge by extensive inquiries in the circumscribed area of East Anglia, but much of his data are applicable to a wider spread in the main broiler-producing areas. It is not possible to go all the way with Mr. James in some of his conclusions, and, as the Director's foreword rightly says, "the profit of 1s. per head shown is probably already too high for current conditions." It is, if costings are truly comprehensive.

The chapters are an Introduction, Capital Requirements, Poussins as a Side-line, Home mixing, Production data and Future market, and there is an appendix on insurance.

Broiler growers and others interested in the subject will find much to stimulate thought, particularly in the chapters on home mixing and the future market. Home mixing versus compound foods does not show a linear relation between apparent costs at all stages of home mixing and production. The economic exercise, which is not made here, is to decide at what level of food-use the capital invested in home mixing will be put to full economic use and still show a saving. The problem is further complicated by the use of the crumbs and pellets favoured by producers.

The future market is discussed in relation to the rising standard of living and interchangeability of animal products within the

BOOK REVIEWS

national diet, and the author assesses the saturation point for the home market at 300 million birds, or 12 lb chicken meat, per head per year. He wisely abstains from forecasting when this will be achieved.

W.M.A.

Farming for Profits. KEITH DEXTER and DEREK BARBER. Penguin. 5s.

It is true, as the authors say on their first page, that publications on farm management have tended to be predominantly either economic theory, farm book-keeping or practical husbandry. Dexter and Barber have set out to combine the merits of all three approaches into a handbook for the thinking, practical farmer, and they have succeeded beyond doubt. The principles involved are clearly explained, and the conclusions to be drawn are underlined. The whole is written in a readable style, and is interspersed with examples drawn from experience which illustrate admirably the points being made.

The opening general section sets out to show that every farmer has need of sound principles of organization if he is to succeed, and on the way debunks various current myths of the practical farmer. It closes with a brief examination of the basic elements necessary to a successful farming system.

The next covers the analytical approach that can be made to any given farm organization to spot the weaknesses in it. This method followed is similar to that practised over most of this country, deriving from the work of such men as C. H. Blagburn, lately of Reading University. There follow chapters on budgeting changes in the organizations to correct faults disclosed by analysis, budgeting complete organizations and capital requirements, together with a useful chapter on sources of capital, and one for the new entrant to farming.

The second half of the book is devoted to considering in more detail some of the characteristics of various types of farming—dairying, arable farms, small farms, hill farms, etc. Here the accent is rather more on the technical aspects of the system, though the economic implications of these aspects are taken fully into account. The appeal of these chapters will obviously be rather more specialized, as few people are likely to be interested in the whole range. But whichever is your own type, here is a good deal of very sound advice and information.

When all is so good, it may seem captious to dissent on a detail, namely, the statement on pp. 223-4 which suggests that labour peaks in cereals, potatoes and sugar beet are not the problem they were in arable farming. In my own experience the reverse is true, and one of the outstanding problems today in arable farming is to get the cropping and mechanization pattern to fit together, and to keep output and costs at a reasonable distance from each other.

Nonetheless, this paperback, so well produced at so low a price, is an outstanding addition to the relatively meagre literature on this subject.

D.B.W.

The University College Farm in the Agriculture of Rhodesia and Nyasaland. A. G. DAVIS. Oxford University Press. 4s.

Agriculture is the most important industry in the Federation of Rhodesia and Nyasaland, and it was not surprising therefore that, in his inaugural lecture, Professor Davis chose as his subject the place of the University College farm in the agriculture of the Federation.

With the great variety of soil and climate, farming areas from 100 to 5,000 feet above sea level, rainfall varying from over 100 inches to under 30, and with farming systems ranging from subsistence agriculture to large scale European enterprise involving high capital outlay, the choice of a suitable site was not an easy one. In his lecture, Professor Davis outlines his reasons for selecting the present site, his plans for developing the farm, and the part he considers that field experimentation and research should play. As he so aptly puts it—the farm is the agricultural laboratory for both staff and post-graduate students.

The science of soil classification and land utilization is highly developed in the two Rhodesias, and Professor Davis describes how he took full advantage of all the services, including an agro-ecological survey, put at his disposal by the Ministry of Agriculture. Few university farms can have made a better start. He also examines the problem of rotations which is so acute in Nyasaland, where the pressure of population on the land makes the provision of adequate resting fallow difficult. Whenever possible, he favours mixed farming as against what he describes as singleness of enterprise, but with the accent on flexibility.

BOOK REVIEWS

The paper also contains a useful discussion on the gulf between European and African agriculture, and concludes that whereas the principles of crop and animal production are the same, the practices, at least at the present time, are different. There are also useful discussions on farm planning, irrigation, finance and management, and the paper will be of interest to all concerned with the teaching of agriculture in Africa—especially for the detailed list of references at the end.

E.W.

Annual Report of the British Council, 1959-60. H.M. Stationery Office. 2s. 6d.

Despite the twenty-six years of its existence, it is a sad fact that the activities of the British Council are not better known. What does the Council do and what does it cost?

The purpose of the British Council is quite simply stated in the preamble to its Royal Charter as "promoting a wider knowledge of our United Kingdom . . . and the English language abroad and developing closer cultural relations between our United Kingdom and other countries . . ." The world can rarely have stood in greater need of understanding of the ways of others than it does today. As to the cost, in 1959-60 the Council spent something under £5 million from the public purse.

The British Council tackles its task in many ways. Books are a sure method of spreading a knowledge of a country and its language, so in 1959-60 we find the Council maintaining a hundred libraries abroad, regularly supplying books to sixty more, and engaged in setting up twenty-two others.

In the year, 300,000 books, as well as copies of 1,750 journals culled from Britain's rich periodical literature, were sent out. These are additional to the Council's own publications. Then there are the book exhibitions abroad. The Moscow exhibition in late 1959 of 4,000 books and 650 periodicals attracted 30,000 visitors.

The Council has a "Teaching of English Overseas" scheme, under which teachers of the language, as well as of other subjects in English, are recruited and placed in schools throughout the world. Foreign teachers also come to the United Kingdom for training. Reference must be made, too, to the Council's invaluable work in receiving and looking after some of the many thousands of overseas visitors and students that come here every year.

Full information about these activities and many others—the sending on tour of all that is best in our drama, painting, ballet, music, etc., the exchanges of scientists and research workers—are to be found in this interesting report. There is no attempt to gild the story. The plain facts are allowed to speak for themselves and should convince even the most phlegmatic critic that here, at least, is one field in which he gets a pretty good return for a surprisingly small investment.

L.W.T.

A new **Readers' Guide** to books on British agriculture has been issued by The Library Association, Chaucer House, Malet Place, London, W.C.1. This is an indispensable compendium for students and for all who wish to tap the wealth of literature which is being produced in this, the oldest field of human enterprise and endeavour.

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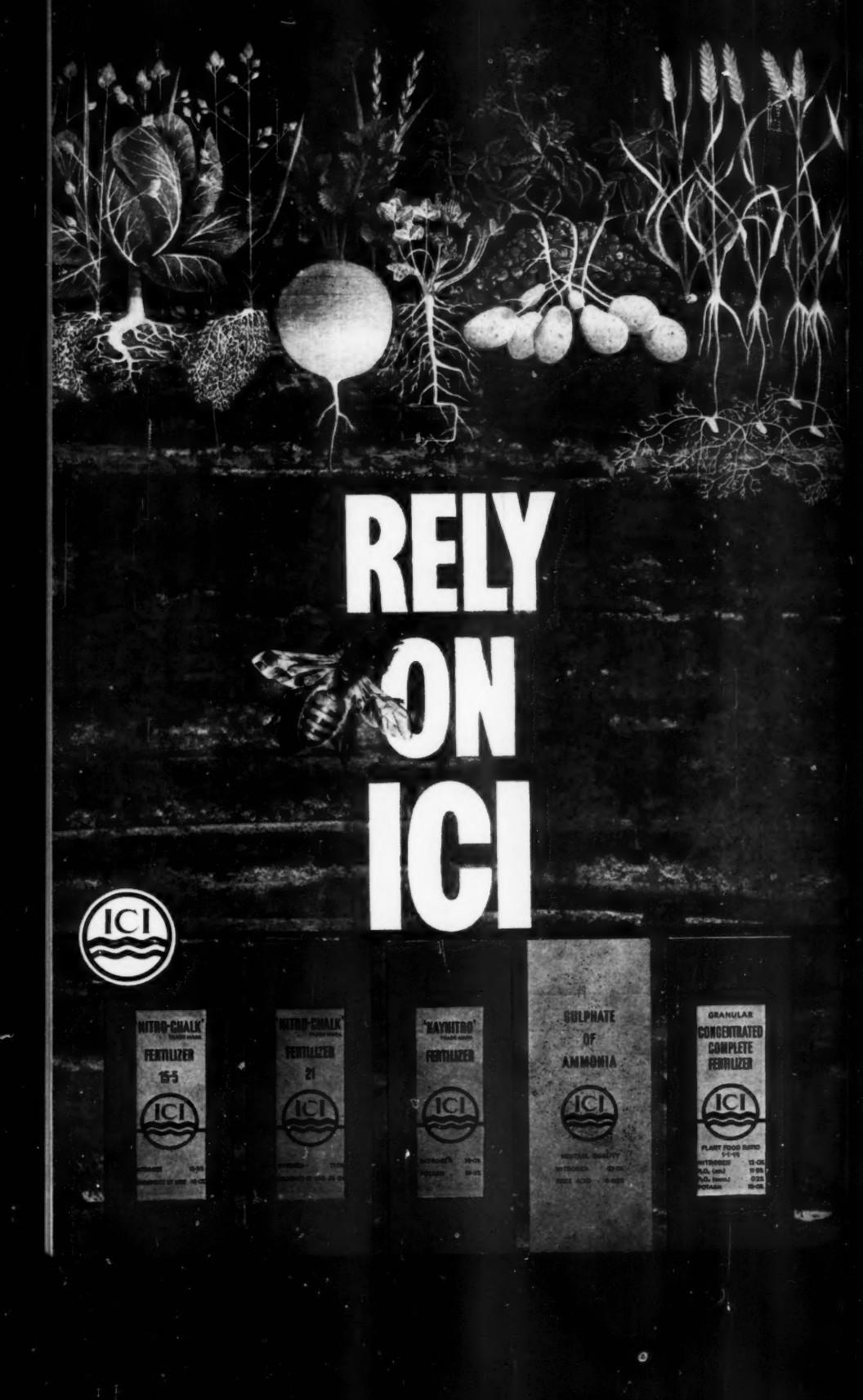
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